GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

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Editorial Notes.

A National Testing Laboratory?

AMONG the exhibits in the Gas Industries Section at the British Industries Fair at Castle Bromwich, none is more encouraging than the co-operative demonstration of the work being done by the Gas Light and Coke Company at Watson House, and by the City of Birmingham Gas Department, on the examination and testing of appliances and materials used in our industry. It is an exhibit ripe with experience and pregnant of possibilities, and it is the outcome of the only policy which can at the present day facilitate progress—co-ordination.

In our description of the Section last week, mention was made of the threefold appeal of this co-operative display—to the general public, to the gas appliance manufacturers, and to the administrators of gas undertakings. To our mind it has the further appeal as a significant pointer to the desirability of establishing some central body for the formulation of standard tests for appliances and materials. Watson House is a highly efficient organization which has far more than justified its institution; and there are other excellent organizations on similar lines in this country—the South Metropolitan Gas Company, Cardiff, and Birmingham are instances. But there remains a definite and an urgent need for much closer co-operation between these organizations, to prevent unnecessary overlapping of work, and to ensure that similar testing operations are carried out under the same conditions, which conditions, by research, experience, and experiment, have been proved to yield the most accurate and reliable results.

The argument raised against the inauguration of a national testing laboratory is that, in the main the apparatus manufactured by makers of repute in this country is usually the result of careful research carried out in the makers' laboratories. This is true; the manufacturers of gas appliances in Great Britain have done, and are in increasing measure accomplishing, extraordinarily good work. In itself, however, it is not sufficient—otherwise organizations such as Watson House would hardly have been established. Doubtless arguments of this nature were raised in the United States, in Canada, in Australia, and in France; yet all these countries have found the value of national testing laboratories.

We are not suggesting plagiarism, for the simple reason that there is no need to copy other countries. Nineteen years ago the idea was broached in our columns. In October, 1911, Mr. R. J. Rogers, of the Birmingham Gas Department, put forward an excellent case for the establishment of a national testing laboratory in this country. "With the daily increasing number of appli-"ances of all descriptions," he said, "it is almost im-"possible for the small or medium-sized undertakings to "carry out tests of all these appliances under conditions "such as they would desire. Besides, there is neces-"sarily a considerable repetition of tests of the same ap-"paratus made by various gas undertakings." The need existed in 1911; developments since then have greatly increased this need.

We advocate a central body for the standardization of tests of appliances and, if desirable, the institution of research. The knowledge obtained by such an organization should be at the disposal of every undertaking in the country, and the smallest concern in the land should be at liberty to submit for test any particular type of appliance. Its inauguration should not—and this is extremely important—in the slightest degree diminish the value of work undertaken by individual gas undertakings, or in any way render special work by these undertakings unnecessary. For example, gas concerns in industrial areas would not lessen present endeavours or cease to undertake particular investigations applicable to the fields for which they have to cater and which they have to develop. Its inauguration ought, on the other hand, to result in a better general service to the industry as a whole, and should eliminate much unnecessary work. Incidentally, as we have observed before, we have no doubt that the public's sympathy towards gas usage would be more readily kindled if approved apparatus bore some "sign of merit." Also, we do not for a moment think that a national testing laboratory would act as a brake on the efforts of the gas appliance manufacturers.

Monthly Accounts.

THE system which has now become normal in the great area of the South Metropolitan Gas Company, of rendering monthly accounts to consumers, has more recently been extended to the district of the South Suburban Gas Company, over whose destinies also Dr. Charles Carpenter presides. Though so new a system in connection with the gas industry of this country, there are other parts of the world in which revision of methods of account rendering have moved faster; and even here, in other connections than gas, the presenting of monthly accounts has made great headway since the war, as those who deal with some of the big London retail houses have found, to their benefit. We are, however, a very conservative race; and new ideas too often permeate slowly. We must confess, therefore, to awaiting with a certain amount of interest an answer to the question: "Do new ideas per-"meate more slowly in the South Suburban area than in "that of the South Metropolitan Company?" Both districts are mainly residential; and both are otherwise largely comparable. They are also contiguous.

The address of Dr. Carpenter at the annual meeting of the South Suburban Gas Company, which was reproduced in full in last week's issue of the "JOURNAL," emphasized the fact that the discontinuance of quarterly account ren-

dering in that Company's district (which took place at Christmas) had been decided upon only after the change-over to the monthly system had been working sufficiently long in the larger South Metropolitan area to enable the Administration to form a judgment of its possibilities. It has, in the South Metropolitan area, fulfilled expectations, inasmuch as "it has completely done away with that "fruitful cause of grievance on the part of gas consumers "arising out of what are known as complaints of charge." It has also eliminated trouble in respect of stopped, or non-registering, meters. All this makes for increasingly friendly relations between Company and consumer, who now pays for his gas, as he does for many other things, on a monthly basis. There are, of course, more benefits than this. Waste, misuse, faults, or other factors likely to give rise to misunderstanding, are exposed at an early stage, and promptly remedied. This greater satisfaction on the part of the consumer is all-important to the Company, who would certainly not have introduced a system which was likely to have any other effect. Dr. Carpenter is hopeful, and so are we, that there cannot be a serious difference between the experiences in the South Metropolitan area and in that of the South Suburban Gas Company.

To what appear to us to be the advantages of the monthly account as such, attention has been drawn in these pages on various occasions; and there is no reason to repeat them now. Briefly, the consumer's gain should be greater satisfaction, and the Company's gain should be greater goodwill. The experience of the South Metropolitan and South Suburban Companies in the matter will be invaluable to the industry; but we are, in addition, looking forward to a trial of the short-period system in connection with a municipal gas undertaking. Only a few weeks ago Alderman J. H. Waddington, of Halifax, speaking at the Huddersfield Conference of the "B.C.G.A.," suggested that the large quarterly bill was working against the gas industry, and declared his intention of asking his Corporation to make their accounts embrace a period of six weeks, instead of a quarter. It is to be wished that the Corporation may give the proposal a fair trial, and that the consumers will approach the matter in a totally unbiased frame of mind. No consumer must feel like the farmer in the old tale, who, when he was asked whether he was a Conservative or a Liberal, replied: "I don't know; but I'm agin' the Govern-"ment."

A Report on Comparative Fuel Costs.

LAST week we published two of the three contributions to the Joint Gas Conference held in Birmingham, and to-day we commence publication of the third—a comprehensive report; it cannot be termed a paper—by Mr. A. H. Barker on the comparative costs of heating, cooking, and hot water supply by solid and gaseous fuels and by electricity, and of cooling by gas and electricity. The report is divided into six sections, and our readers have before them to-day the first portion, concerned for the most part with heating, to which subject we intend to confine our comments. Before saying anything at all about this particular phase of the report, however, it is only common justice to thank the author. For five years he and his household have been put to very great inconvenience; during this period his home has been virtually a laboratory, and the fact that throughout, in spite of several changes of cooking methods and apparatus, he has retained his cook demonstrates the fallacy of putting all one's eggs into the basket of generalization.

In regard to heating by coal, gas, and electricity in the open fire, Mr. Barker comes to the following conclusions. That for continuous use, a gas fire with gas at 10d. a therm is approximately twice as expensive as a coal fire with coal costing 40s. a ton, and that electricity is one-and-a-half times as expensive as gas when the unit of current is sold at 1d. The basis of this comparison is fuel cost only; and, as everyone knows, fuel is by no means the only cost of a fire. Labour charges have to be taken into account, as also has the general depreciation of decorations. Everything considered, observes Mr. Barker, "it was found that the gross cost of the gas was not notably greater than that of a coal fire." When used intermittently, in an occasionally occupied room, then "the cost of the gas fire in fuel alone was distinctly less than that of a small coal fire continuously burning."

That portion of Mr. Barker's report under the sub-heading "General observations on the comparison of coal, gas, and electric fires" will be read with the greatest interest, though it will not be wholly palatable to our readers. The author expresses the personal opinion that the gas fire is not so artistic as either the coal fire or the electric fire, and the hope that gas appliance manufacturers will copy the attractiveness of the fires made to consume electricity. All our readers must feel more than grateful about the unbiased work of Mr. Barker, and about his conclusions, which in regard to gas are most favourable. At the same time, it is difficult to appreciate why the author thinks the modern gas fire so woefully lacking in beauty of line, symmetry of design, and appropriateness to particular surroundings. Our own idea—and this has nothing to do with the fact that this is a "GAS JOURNAL" article—is entirely different. When a coal fire is not burning in the grate, the void has nothing whatever to recommend it; nor is it rendered more attractive when it becomes a chance depository for odd ferns and the like. Also, we do sincerely hope that gas appliance manufacturers will not camouflage the gas fire to appear like an element carrier. It is but fair to add that Mr. Barker's observations do not extend to the "Cinderella" gas fire.

Still on the topic of the gas fire, we would emphasize a few of the author's suggestions. Gas fires, he says, should be provided with pilot lights, and it should be possible to switch them on or off at the door of the room. Also, they ought to be fitted with some form of simple and inconspicuous gauge to indicate the rate of consumption. Such a device is "almost, but not quite, as important as a thermometer on an oven." Finally, since negligence spells economy with a coal fire, but the reverse with a gas fire, careless people, such as maidservants, should not be provided with the latter aid to comfort.

An Appliance with a Future.

LAST month before the Midland Junior Gas Association, and on Feb. 12 before the Institute of Fuel, Mr. C. Featherstone Hammond described his remarkable submerged burner and considered a few of its applications. The meeting of the Institute of Fuel, it may be mentioned, was well attended, and everyone present who joined in the discussion on Mr. Hammond's paper expressed the same view—that the Hammond submerged burner is an appliance with a future. We have had this feeling ourselves for a long time; we believe that this exceedingly efficient appliance—efficient not merely from the point of view of heat utilization, but also from the aspect of excellent design and engineering workmanship—will widen the sphere of usefulness of gas in both the large domestic and the industrial field, more particularly in the latter.

In common with the majority of successful inventions, the Hammond burner is characterized by simplicity of basic idea. The principle is one-stage rapid and complete combustion, attained by burning a perfect, homogeneous mixture of gas and air in chemically correct proportions and of uniform composition. So well is this achieved in the Hammond unit that the flame is unquenchable and the rate of combustion 200 times that obtained in the combustion chamber of a high-duty boiler under forced draught. The extremely high thermal efficiency is due to direct contact with the medium to be heated, and, in regard to the circulator unit, to recovery of the latent heat of the water vapour in the products of combustion. The author estimates the effective area of contact of one cubic foot of the gas in solution at approximately 1·65 acres.

Last week we commenced publication of a lengthy extract from Mr. Hammond's paper; and this section dealt with the submerged combustion hot-water circulating unit. The apparatus occupies very little space, is automatically controlled, can be put into action at a few minutes' notice, and quickly operates at full output at a thermal efficiency of about 95 p.ct. on the gross calorific value of the gas. The method of effecting circulation of the water is fas-

inating, and the apparatus eliminates the necessity for a flue, saves all bunkering accommodation, and does away with the labour of stoking or of ash-removal. Moreover, the unit can be positioned at the top of a building—a valuable feature in many offices. During the discussion on Feb. 12, Mr. Hammond said he believed he could show that anthracite systems could not ultimately compete with his method, if only for the reason that it was impossible accurately to control thermostatically an anthracite stove. He also said he would be prepared to place the submerged-combustion system in the hands of a housemaid.

Incidentally, the applications of the Hammond unit, already many, will, we think, rapidly increase in number. The section of the paper which we publish to-day deals, among other things, in some detail with the use of gas for boiling oil, for dyeing operations, and for white metal melting. The good results which have met its application to oil treatment and to dyeing are the outcome not only of the efficiency of the heat transference (which, in the case of oil preparation, represents, it is stated, a fuel cost of less than one-quarter that in normal external firing practice) but also of the manner in which the heat is transferred. For example, it has been found that the dyeing process is more efficiently carried out at a lower temperature when the submerged flame is used than that required for the same result when the vat is steam-heated. In the author's words: "It will be evident to everyone "that the process of dyeing wool fibres and woollen "goods is one fraught with the danger of shrinking those "goods if, as in orthodox practice, it has to be carried "out at or near 212° Fahr. It has been found in practice "that equal tintorial results can be obtained with better "penetration at 180° Fahr. when using the Hammond "process." The only "snag" advanced at the Institute of Fuel was by Mr. W. J. A. Butterfield, who mentioned that the system was dependent on the continuity of supply of electric current.

Choice of Words.

We were able in last week's "Journal," in some seven columns of space, to give readers without loss of time the gratifying contents of the report to the Board of Trade of the Departmental Committee on Deaths from Gas Poisoning. Among the conclusions of the Committee, the first is that in recent years the number of accidental deaths from gas poisoning shows, on the whole, no appreciable increase, and remains at a figure which the Committee consider gives no cause for alarm. Yet a popular daily paper heads its brief reference to the report "Gas Poison Perils." We suggest, with all due deference, that such a caption as this is calculated to give rise to just that state of alarm for which the Committee, after a full inquiry, have found that there is no need. In this way, the industry is likely to be prejudiced; and that, we are convinced, must be the very last thing that was in mind in penning the words complained of.

In another newspaper before us, an article is stated to deal with "Manhole Gas Fatalities," but on investigation the reader learns that three men had been "gassed" in a manhole on the site of a new cemetery—it being found that the fatalities were "caused by carbon monoxide gas "given off from refuse in the dry dust used as part filling-"in of trenches." Thus they were not "gas fatalities" at all in the sense which the term is generally held to convey. Nowadays people are too busy to read the whole even of their favourite paper, and some of the news has to be gathered by a glance at the headlines. It is when this happens that a wrong impression may be given in such a case as that alluded to. As has been explained before, the gas industry labours under a disadvantage in the fact that the word used to describe its commodity is common to a number of other things—good, bad, or indifferent.

The Press of this country has always rightly been regarded as among the leaders of public opinion, and so should exercise every precaution against sending readers astray. It is for this reason that we once more appeal to them to qualify "gas" and "gassing" when the intention is not to refer to the article supplied by the great gas industry.

Looking Forward to the Budget?

As the time for the presentation of the Budget draws nearer, the amount of attention paid to matters of taxation increases. We are pleased to note this growth of interest in the nation's most vital problem; and our hope is that when the Budget is a thing of the past, this interest will not flag for another twelve months. At the moment, the signs and portents are that there will, when the decrees of the Chancellor are made known, remain ample material to keep alive the interest to which we refer. Only a short time ago, Mr. Churchill predicted that, if the Chancellor continues on his present lines, the annual expenditure of the country in three or four years will be not far short of £1,000,000,000. Of course, the Chancellor may not continue on his present lines; but until convincing proof of reform is forthcoming, a good round figure of this kind is well worth keeping in mind. This is not a question of politics; but a matter of the industrial life or death of the country—no less.

The Finding of the "F.B.I."

So deeply smitten have politicians been with the "sweet simplicity" of the income-tax, that they have never failed to turn to it in times of stress. It is all so easy. A penny on the income-tax represents so much; therefore, so many pennies represent so many times so much. But does it? These simple little calculations have a troublesome knack of coming unstuck somewhere; and a report lies before us which seems to put a pretty big spoke into the wheel of this particular one. Like ourselves, the Federation of British Industries have been for some time gravely concerned at the increasing burden of taxation upon productive enterprise; but, unlike us, they have taken the opportunity to delve deeply into the matter, with the result that they have compiled facts and figures which in their opinion afford conclusive evidence that the limits of industry's taxable capacity have been reached, and that the present volume of production is insufficient to provide without grave injury to the national economy the sums now being expended by the State on unproductive purposes. Nevertheless, the country is faced with the prospect of additional taxation.

Can the Income-Tax Fail Us?

The Federation of British Industries have tabulated the net amount produced over a series of years for each penny of the normal rate of income-tax; and here one sees the "writing on the wall." Taking the four years from 1925, the estimates show respectively the following net production of each penny: £4,917,000, £4,869,000, £4,750,000, and £4,583,000—a progressive decrease. This is taken by the Federation to suggest that the losses attributable to persistent depression in our heavy basic industries and the staple textile trades, together with the vast burden of unemployment relief and wastage of productive effort which they have entailed, are not being counterbalanced by gains in other directions. Among the causes of the present disquieting state of affairs, the Federation point out that no account appears to have been taken during recent years of the cumulative effect of the burden of taxation on a decade of industrial depression accompanied by a falling price level and credit stringency.

What a Higher Income-Tax Will Mean.

Writing a week or two ago in "The Times" Trade and Engineering Supplement, Mr. Harold Cox showed what a very serious matter an increase in the rate of income-tax will be in the present condition of our industries. "An increased income-tax," he said, "means that the taxpayer is left with less money available for saving. In addition, he knows that whatever dividends he gets on his savings will also be taxed, and that the capital itself will be taxed at his death, so that he has little inducement to save anything out of his diminished income. Thus less capital is accumulated and the current rate of interest continues at a high figure. Yet one of the most important requisites of modern industry is cheap capital. Ever since the machine era began, capital has been playing a steadily increasing part in the work of production, and the developments of the last few years have immensely added to the importance of capital. What is known as 'rationalization'

involves the scrapping of out-of-date factories and machines, the erection of new and better-planned buildings, and the installation of new machinery, which will render possible a larger output with less cost for each item. All this means that vast sums of additional capital will be required; but if capital is scarce it will necessarily be dear, with the result that production will be encumbered by the heavy weight of a high annual charge for interest." Thus does the worker, as well as the heavy income-tax payer, lose.

Lower Taxation the Secret.

The burdens of taxation have also formed the subject of a letter to "The Times" by Mr. George Lambert, M.P., who refers to the fact that the wage-earners are deluded by the idea that the rich alone pay taxes. There is, as he says, no greater fallacy. High taxes mean high interest rates; capital can take care of itself. "Trade declines," remarks Mr. Lambert, "and unemployment grows. Rates and taxes increase the cost of making and distributing every commodity we produce. The world hungers for our goods. It does not buy them because they are too dear; consequently we have a growing army of unemployed. In America taxes have been reduced. In England they have been increased. In America wage rates are double and taxes less by more than a half of those levied in England—an object-lesson for our wage-earners. New taxes, whether tariff taxes or income taxes, will add to the costs of production and lower the standard of life of the working producers."

Forthcoming Engagements.

Feb. 28.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Dr. S. Pexton on "The Water Content in Tar."

March 6.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Meeting of Members in the Yorkshire District, 4 p.m., Queen's Hotel, Leeds.

March 6.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the afternoon.

March 6.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual General Meeting, Grand Hotel, Birmingham.

March 8.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Visit to Messrs. Thomas Glover & Co., Ltd., Leith. Address by Mr. A. W. Sharman on "Some Aspects of the Usage and Construction of the Dry Gas Meter."

March 8.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Annual General Meeting in Glasgow. Paper by Mr. John Greig, of Glasgow, on "Production of High-Grade Coke."

March 11.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board.

March 19.—BRITISH COMMERCIAL GAS ASSOCIATION.—Executive Committee, London.

March 20.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Meeting of Members in the Midlands, Grand Hotel, Birmingham.

March 21.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Dr. H. T. Angus, Ph.D., M.Sc., on "Gas Cooker Oven Ventilation and Hotplate Burner Efficiency."

March 22.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Joint visit with Yorkshire Junior Gas Association to Messrs. West's Gas Improvement Co., Ltd., and City Justices Meter Testing Station, Manchester.

March 25.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—Diamond Jubilee and Annual Meeting, Midland Hotel, Manchester.

March 28.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual General Meeting at the Hotel Cecil, Strand, W.C. 2, 2.15 p.m.

June 2-5.—INSTITUTION OF GAS ENGINEERS.—Annual Conference in Leeds.

Correspondence.

A "Fair" Complaint.

SIR,—Complaints have been received by the Gas Industries Section Committee, from exhibitors, of the "poaching" within the Gas Section by representatives of firms in the gas industry who are not exhibiting, and who are not contributing in any way to the expense of the organization of the Section. The complaint is that such representatives, particularly during the days of the Gas Conference, have been engaging the attention of gas engineers and buyers.

Every stand in the Section has entailed an outlay of money, time, and thought on the part of the exhibitor; and it is very disappointing to them to see the representatives of firms who have not co-operated in this effort of the gas industry taking advantage of the exceptionally good attendance of gas engineers.

The Fair Authorities are unable to refuse admittance to these non-exhibitors—who may well be potential buyers in other sections of the Fair—and exhibitors can only rely either upon the sense of fairplay of non-exhibiting firms, or on the far more unpleasant process of individual complaint to the Gas Industries Section Committee.

This Committee believe that in many cases representatives are taking advantage of the Gas Section without the knowledge of the principals of their firms, who would recognize that such methods of doing business reflect upon their reputation, and in the end may well do more harm than good.

Gas engineers and buyers can assist exhibitors by voicing their opinions to any representative of a non-exhibiting firm who approaches them in the Gas Section, for they must realize that through the co-operation of the various manufacturers who have taken space in the Section the gas industry on the whole receives a very fine national advertisement and keeps its "place in the sun" alongside other competing forms of light and heat; and these manufacturers deserve loyal treatment from the industry.

R. J. ROGERS,
Hon. Secretary, Gas Industries Section.

British Industries Fair, Birmingham,
Feb. 22, 1930.

Permissible Charges (per Therm) for Coal Gas to Compete with the Coke Firing of Retort Settings.

SIR,—In the published Diploma Thesis (p. 383 of the "JOURNAL" for Feb. 12) this most interesting problem has been solved as 2·67d. per therm (approx.) = 1s. 1¼d. per 1000 c.ft. Assuming the correctness of this figure, then every gas-works (and there are some) putting gas into holder at 1s. 1¼d. per 1000 c.ft. ought economically to be heating their settings by coal gas instead of coke.

I submit that on the data shown the figure should be, not 2·67d., but 1·38d. per therm—viz., 17⅛ tons of coke at 21s. 3½d. per ton gives 3240 therms to heat the settings = $\frac{£18\ 12s.\ 7d.}{3240}$ = 1·38d. per therm = 7·9d. per 1000 c.ft., including all charges, gas delivered to setting. At this price but few gas-works can contemplate the change from coke firing to coal-gas firing of their retort bench. Nevertheless coal-gas firing of retort settings is coming, and the economic factors of this method must be kept within view.

Assuming that in a particular gas-works the settings are equipped with means for coke firing or coal-gas firing *ad lib.*, then there is introduced a new and powerful economic policy—the gas engineer becomes at once his own biggest customer for either coke or coal-gas. This gives him considerable government in his own market, and at the same time enables him in summer time, or when opportune, to use without additional oncosts of capital his existing carbonizing plant to produce the extra gas required. Thus for the same town gas requirements, the coal throughput would be greater and the residual turnover enhanced. In conclusion, it is the turning to account of such elusive economic factors (as with benzole recovery) that the immediate way to cheaper therms lies.

"AD REM."

Feb. 21, 1930.

Personal.

The "London Gazette" for Feb. 19 contains the following notice: ROYAL ENGINEERS—55th (W. Lan.) Divl. Engrs.—Lt.-Col. W. M. Carr, T.D., to be Bt.-Col.; Feb. 16, 1930. Bt.-Col. Carr is Engineer, General Manager, and Clerk to the Stretford and District Gas Board.

Among those recently elected to Membership of the Institution of Civil Engineers are Mr. JAMES EDWARD BLUNDELL, Engineer and Manager to the Carlisle Gas Department, and Mr. CHARLES DRU DRURY, Engineer to the Sunderland Gas Company.

Mr. F. N. HOWES has been appointed Gas Engineer and Manager to the Chelmsford Corporation, in succession to Mr. E. W. SMITH, retired. Mr. Howes has been for the past six years Deputy-Engineer and Manager to the Burnley Corporation Gas Department under Mr. J. H. Clegg, F.C.S. There were 89 applicants for the Chelmsford position.

Owing to the pressure of professional duties, Sir ARTHUR DUCKHAM, G.B.E., K.C.B., has been obliged to resign the position of Chairman of the Advisory Committee set up to advise the Government on applications for assistance from public utility undertakings under Part I. of the Development (Loan Guarantees and Grants) Act, 1929. Sir Arthur, discussing the Committee's work, said the most remarkable feature was the comparative paucity of applications. It was a matter of surprise that the flow of applications, which was fairly free at the commencement of the Committee's work, had latterly tended to slow down, and every application made to date has been dealt with. "The Committee was formed by Mr. J. H. Thomas to ameliorate unemployment, and began its operations last August. Charged with dealing only with public utility undertakings, we have received the heartiest co-operation from all Government Departments, and no avoidable delays have been allowed to take place. The simplest forms have been adopted for application and implementation of grants, and we have found applicants thoroughly reasonable in accepting proposals, most anxious to use British material, and very energetic in starting up work. The gas industry has put forward a good many schemes, and in all cases it has shouldered a part of the burden of acceleration."

Mr. WILLIAM MATHIESON, formerly Managing Director and now Chairman and Advisory Director of Messrs. Wilsons & Mathiesons, Ltd., Leeds, is the donor of Horsforth Hall and 28 acres of ground to the Horsforth Urban District Council. The hall is one of the oldest manorial houses in the district, one of the first lords of the manor having been the famous Archbishop Cranmer. The only condition attached to the gift is that it shall be for public use for all time as a park and recreation area.

In To-Day's "Journal."

Joint Gas Conference at Birmingham.

A full report of the entire proceedings at the Joint Gas Conference is given. As for the contributions themselves, the papers by Mr. F. J. Gould and Mr. W. B. McLusky were published last week, and the discussions appear to-day. The first instalment of Mr. A. H. Barker's lengthy report on the comparative cost of coal, gas, and electricity for heating, water heating, and cooking is given, together with discussion,

An Address by Mr. Copp.

In an address before the Scottish Junior Gas Association (Western District), Mr. Harold E. Copp, Senior Vice-President of the Institution of Gas Engineers, emphasized the necessity of maintaining the lighting load. "For quality of light and cheapness," he said, "gas is, in most cases, greatly superior to electric lighting. I mention this matter as in some quarters gas lighting is not receiving fair play, even at the hands of many engaged in the industry. Gas lighting is the most self-evident use of gas, and, as the eye is the window of the soul, it is a subject which should receive our most serious attention. Except for purely decorative effects, gas lighting is superlative where pure light, without glare and without extravagance, is desired."

Coal, Gas, and Electricity for Room Heating.

Mr. Barker arrives at the following conclusions on this important matter: A gas fire is about 2·1 times as expensive as a coal fire in fuel alone, when it is continuously used, and an electric fire, when out in the room and not in the fireplace, is 1·57 times as expensive as a gas fire, all doing the same continuous duty for the same time. Electricity when used in these conditions would have to be sold at 0·6d. per unit to compete with a gas fire at 10d. per therm. (The prices taken for the comparison were: Coal, 40s. per ton; gas, 10d. per therm, electricity, 1d. per unit.) When used intermittently, in an occasionally occupied room, the cost of the gas fire *in fuel alone* was distinctly less than that of a small coal fire continuously burning. These figures apply to what are probably a typical dining room and a typical drawing room.

Coal Mines Bill.

The following resolution was passed at the Joint Gas Conference:

> That it is the considered view of the Joint Conference of the National Gas Council, the Institution of Gas Engineers, and the British Commercial Gas Association, that Part 1 of the Coal Mines Bill, which compels all coalowners to reduce their output—thereby increasing the price of coal—and which deprives consumers of their power to select suitable supplies of coal at agreed prices, is unfair to gas undertakings, and definitely inimical to the interests of gas consumers.

Topical Items.

Official Inauguration of the Gas Supply to the Priory Estate, Dudley.

As mentioned in the "JOURNAL" last week, the supply of gas to the new Priory Estate Housing Scheme of the Dudley Corporation was officially inaugurated by the Mayor of Dudley, Alderman J. H. Molyneux, and the Chairman of the Housing Committee of the Dudley Corporation, Alderman F. W. Cook, accompanied by members of the Committee, on Feb. 7.

At the gas-works, the Mayor turned the gas into the new main; and upon the estate, to which the party subsequently travelled by car, the Chairman operated the first slot meter and lit the first gas cooker. Some of the completed houses were inspected, and the party then adjourned to the Dudley Arms Hotel, where they were entertained at lunch by the Directors of the Dudley Gas Company. The Chair, in the unavoidable absence of the Chairman of the Company, was taken by the Vice-Chairman, Mr. W. H. THOMPSON, who proposed the toast of "Success to the Priory Estate Scheme." He said that it was within the memory of some of them when the relations between the Company and the Corporation were not of the best, but he was pleased to say that to-day their relations were of the happiest, and the commencement of this could perhaps be credited to the late Alderman G. F. Thompson, a former Chairman of the Gas Company.

Mr. F. C. BRIGGS, the Engineer and General Manager of the Company, reminded the members of the Committee that the Company and the Committee had agreed a scheme which, unfortunately, the Corporation in its wisdom rejected. They had no quarrel with the Corporation's desire to obtain electricity upon the estate. The estate would obviously be incomplete without. But whether the method adopted was the wisest was open to question. There were many things which gas could do very much better and more cheaply than electricity. There was very little in a working-class dwelling that electricity could do that gas could not do equally well. Gas could not operate a

vacuum cleaner or grill bacon actually upon the breakfast table as conveniently as electricity. But it was doubtful whether these were normal requirements in a working-class dwelling. For lighting in a working-class dwelling, gas had the undoubted advantage that, while it gave the light at certainly not a greater cost, an amount of heat was also given free, which assisted the workman's housekeeping budget. Even one modern incandescent burner alight for an evening, gave, in addition to the light, as much heat as 4 lbs. of coal burnt in the grate. It was, therefore, certainly arguable whether it was in the national interest that public money should be spent to instal both gas and electricity in working-class dwellings with little prospect of reasonable return to either interest.

In regard to the present scheme, to the first section of 564 houses there would be over 4½ miles of main laid. The mains were all of steel, British made, and every joint had been acetylene-welded. The whole pipe, therefore, formed one continuous steel structure, and it had been tested to 50 lbs. per sq. in. by air pressure, and should be free from leakage for all time. He might mention that the slot meter that the Chairman of the Committee had operated was the first ever used in this country of a new type. It was British made, and allowed the consumer to drop a penny, a sixpence, or a shilling into the same slot and obtain a proportionate quantity of gas for the coin. It was more costly than the ordinary slot meter, but its undoubted convenience persuaded them to adopt it.

The MAYOR, in reply to the toast, said that most of them were aware that the Housing Committee felt that on the Priory Estate they should have had "all-gas" houses, but, unfortunately, the Council had disagreed, and it was decided ultimately to have the two systems, gas and electricity. He had watched the work throughout, and had been greatly struck with the expeditious manner in which the Gas Company had carried it out.

Alderman COOK also replied to the toast, and paid tribute to the work of the Gas Company.

Councillor J. T. HIGGS, speaking on the housing question, stated that when the question of lighting in workmen's dwellings, and particularly in schools, was being considered, it should always be borne in mind that gas had a very strong ventilating effect. The heat of the gas caused a more rapid circulation of air, destroying and removing the noxious products breathed out by persons in the rooms, which would otherwise be re-breathed, with detriment to health.

Lecture on Submerged Combustion before Midland Juniors.

A well attended meeting of the Midland Junior Gas Association was held at the Council House, Birmingham, on Jan. 30, when Mr. C. FEATHERSTONE HAMMOND, Managing Director of Submerged Combustion Ltd., Victoria Street, S.W. 2, gave an instructive talk, illustrated by lantern slides, on the subject of "Submerged Combustion."

In introducing Mr. Hammond, the CHAIRMAN—Mr. W. McNaughton—said they were to be congratulated in that they were the first Gas Association to have the privilege of a talk on this subject.

Mr. Hammond then gave his lecture, which was on the same lines as his paper before the Institute of Fuel, the first part of which was published in the "JOURNAL" last week, and a continuation of which will be found on later pages of this issue.

Mr. T. H. POULSON (Stafford) said it was important that they could be sure of the efficiency of the non-return valves; otherwise there might be mischief from phosphoric acid or some other acid. He saw great possibilities for the system.

Mr. W. E. CADWALLADER (Birmingham) said he first saw a demonstration of the principle of submerged combustion in 1905, and he was able now to appreciate the enormous progress that had been made. The Hammond method appeared to be on a thoroughly scientific basis.

Mr. E. ARTHUR (Birmingham) inquired as to the effect of the absorption of the products of combustion if sulphur compounds were present.

Mr. J. H. THOMAS (Smethwick) asked for further information as to the process with regard to metal melting. He wondered whether the absorption of gas would affect the castings. Would their quality standard be affected if the gas impigned on the molten metal?

Mr. FEATHERSTONE HAMMOND, in reply, said that finality had not been reached in regard to metal melting; and there were indications that a great improvement would be obtained on existing practice. At present, however, they were not out of the development stage. As to the effect of gases on the metal, he pointed out that they did not remain in the metal so long as temperature conditions were watched. There was an apparatus designed to get rid of the gases before casting took place. They did not become entangled in the metal, and there was no question as to getting rid of the gases. The commercial application of the process was steadily growing, and the sizes of the installations were becoming larger and larger. With regard to the question raised on the subject of lime deposits and scale in the central heating unit, water was not required for "make-up," so that there was no danger arising from lime deposits. Any lime that was precipitated could be easily got rid of. There were no incrustations; the lime came down as flocculent sludge. Regarding the disposal of the products of combustion, he explained that the gases left the water at a fairly high temperature, and water was then loth to take up gases in solution. With pressure their departure was facilitated. Their largest standard unit at present was one of 1 million B.Th.U. per hour. As to the question of sulphur compounds, the analysis of the water showed that the *p*H value was practically unaltered after a year. Sulphur was not present. Whatever might be the form of sulphur, it was not soluble. There were no large installations in the hands of private users at present, but he did not apprehend that any difficulty would arise on the question of the size of the equipment. The burners behaved exactly the same in the large as in the small sized installations; no difference in principle was involved. In the small units the burners were lighted by a match, and in the larger ones by a sparking plug. The explosion occurred in an orderly manner. There was no large body of mixture to cause danger.

Mr. H. R. HEMS (Birmingham) moved, and Mr. C. F. TOOBY (Coventry) seconded, a vote of thanks to Mr. Hammond.

Evening Star Chapter, No. 1719.

Owing to the recent additional applications for admission, a chapter of emergency was held on Feb. 12, at Freemasons' Hall, Gt. Queen Street, London.

Most Ex-Comp. Walter McDowall, the Z. of the Chapter; Ex-Comp. W. D. Hammond, the H.; and Ex-Comp. Frank West, the J., were in their respective places. Ex-Comp. Alfred C. Beal, P.Z., Scribe E. of the Chapter, was present; as was also Ex-Comp. Carr, the Chapter's Scribe N.; and Comp. Bidwell, the P.S. Ex-Comp. Arthur Eves, P.Z., and Comp. Dashwood acted as A.S.'s. The Organist of the Chapter, Ex-Comp. Walter T. Dunn, P.Z. (Junior Engineers Chapter, No. 2913), officiated during the evening.

The two candidates for exaltation were Bro. Frank Sidney Evans, of the St. Alban's Lodge, No. 29; and Bro. John Sheridan, of the Bagshaw Lodge, No. 1457. The ceremony having been duly carried out, the three lectures were respectively ably delivered by Ex-Comp. West, J.; Ex-Comp. Hammand, H.; and Most Ex-Comp. McDowall.

At the conclusion of the business meeting, the companions repaired to the adjoining Connaught Rooms for dinner.

The installation convocation of the Chapter will take place on April 11.

Most Attractive Display Yet Staged at London Section of the "B.I.F."

An all-round improvement has been effected by holding this year's London Section of the British Industries Fair at Olympia instead of, as formerly, at the White City. Comfort for the visitor is combined with accessibility to the various exhibits, which are for the most part uniform in style, and are throughout the Fair compactly sectionalized. Of course, only the new Empire Hall has made it possible to accommodate the numerous displays, the total available area having been increased to 420,000 sq. ft., of which 250,000 sq. ft. is being used for the actual exhibits. The various sections are in close touch with one another, and are so arranged that the exhibits of allied trades come together. The least accessible stand is only 130 yards from the nearest entrance, and, while there are about six miles of stand frontage, every exhibiting firm can be easily and quickly found.

As far as the gas engineer is concerned, a visit to the London Section of the "B.I.F." must be regarded as an enjoyable spectacle rather than as a business proposition; but there are several stands of particular interest, chiefly in the Chemical Section.

Excellently set out, with most effective lighting, are the exhibits of the Gas Light and Coke Company, who are showing their series of bye-products, and several special grades adapted to modern requirements. Pitch, best known in its medium soft state, can now be produced to specified penetration tests for road work according to buyer's requirements. Road tar for surface dressing, tar macadam, and grouting, may also be had in standard grades and to specification. Creosote is produced to a variety of specifications for employment in the manufacture of disinfectants and sheep dips and for wood preservation processes. Naphthalene is supplied in crude forms and every form and grade up to the highest commercial purity.

The South Metropolitan Gas Company's stand is novel. It takes the form of an old London gateway, and is exceedingly attractive. The display of "Metro" products comprises a wide range of inorganic and organic compounds resulting from the manufacture and purification of coal gas and the distillation of crude coal tar. A few which might be mentioned are: Road tar to the British Ministry of Transport specifications, disinfectant fluid approved by the Ministry of Agriculture, "Metro" tar oil winterwash, an emulsion of a specially selected "high boiling" tar oil (the oil used in its preparation being the same as that which has produced such satisfactory

results in the trials on dormant fruit trees conducted by the Long Ashton Research Station), creosote, pyridine, anthracene, naphthalene, motor benzole, black varnish, light and heavy oils of various grades and characteristics, &c.

Other stands of interest include: The Accurate Recording Instrument Company, Ltd. (thermometers, pressure and vacuum gauges, temperature control regulators, and pyrometers); B. Black & Son (thermometers for research and industrial requirements); Cambridge Instrument Company, Ltd. (pyrometers and automatic temperature recorders and controllers); Chance Bros., & Co., Ltd. (scientific glassware); Hailwood & Ackroyd, Ltd. (lighting glassware and chemical and heat-resisting glassware); James A. Jobling & Co., Ltd. (laboratory glassware); and John Moncrieff, Ltd. ("Monax" laboratory glassware and tubing).

Notes from the Fair.

Record Attendance.

The official reports as to the attendance, the actual business done, and the number of trade inquiries received at the Heavy Section of the British Industries Fair at Castle Bromwich are very satisfactory. They are the more convincing by reason of restraint in tone. The attendance for the first week was a record in the history of the Fair, and on Saturday, which was "Public Day" (cheap facilities having been afforded to works parties), the attendance was approximately 40,000. This was 12,000 more than on the corresponding day of last year.

* * * *

Good Business.

As might be expected in an exhibition in which the diversity of manufactured products was so great, the business experience of standholders naturally varied considerably, but, on the whole, it would appear that the trade position was satisfactory. This view is based entirely on exhibitors reports supplied to the Birmingham Chamber of Commerce. The trade reports from the Gas Section were most encouraging; and while actual buying of heavy engineering equipment was hardly so good as last year, the number of inquiries appeared to be about up to the average. As showing what may be called the continuing influence of the Fair in trade, it may be mentioned that a firm took an order for a conveyor, for which specifications and other particulars were supplied at the Birmingham Exhibition of 1926.

* * * *

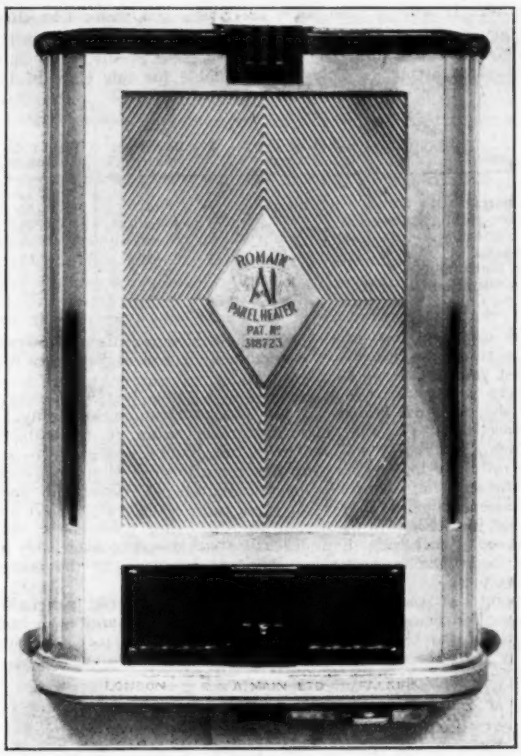
Prince George's Interest in Gas.

On Thursday last H.R.H. Prince George visited the British Industries Fair at Castle Bromwich, and spent some time inspecting the joint exhibit of the Gas Light and Coke Company and the Birmingham Gas Department. The *raison d'être* of the display was explained to the Prince, who expressed his interest in this joint endeavour.

A New Panel Heater.

On the stand of Messrs. R. & A. Main, Ltd., is shown a new and improved form of gas radiator. It should prove a popular method of warming such places as garages, halls, offices, &c., since it has the great virtues of taking up practically no space, of a very low gas consumption, and of extreme simplicity of fixing. The "Romain" heater is designed on modern decorative lines and constructed of wrought iron throughout. It measures 27½ in. high by 18¾ in. wide, and is only 4 in. deep. It is provided with lugs for fixing it upon the interior wall at any convenient height above the floor. The method of heating is simplicity itself, by two gas jets; a sight-glass is fitted so that the height of the flames may be observed.

No flue is necessary, so that installation costs are reduced. There need be no fear of danger from the contact of a naked



flame with petrol fumes when this heater is fixed in a garage, as in these cases the lighter door is securely fastened to prevent all possibility of contact, and a by-pass is fitted.

Because it fixes upon the wall and not on the floor, as is common with radiators, the "Romain" heater causes no curtailment of floor space, and no obstruction. It gives a most useful distribution of heat where it is most required. In the case of garages, it can be placed upon the wall so that its hottest rays project horizontally across the space in direct line with the radiator or coachwork of the car. In halls or landings of houses, where the floor space is limited, it can be fixed on the most convenient part of the wall, and will not encroach on the floor or interfere with cleaning. The "Romain" heater can be obtained in two-tone finishes of black and silver, or black and old gold.

AT THE BRITISH INDUSTRIES FAIR, BIRMINGHAM.

Commercial and Industrial.

Stock Market Report.

[For Stock and Share List, see later page.]

A general dulness was displayed in most markets last week; and this was reflected in the Gas Section, which was comparatively uneventful. It will be seen from the Stock and Share List that the ordinary and preference stocks of most of those companies whose financial year closed in December have gone *ex* div., and at these prices some attractive yields are available for this class of investment. To take a few examples:

—	Dividend 1929. P.Ct.	Middle Market Price.	Yield P.Ct. per Annum.
			£ s. d.
Commercial . . .	6	89½	6 14 0
Croydon sliding scale.	7	103½	6 15 3
Gas Light	£5 12s.	17s. 9d.	6 6 2
Newcastle	£5 7s. 6d.	16s. 1½d.	6 13 4
South Metropolitan .	6½	98	6 7 6
South Suburban . .	6½	99½	6 10 8

The ordinary stock of the Tottenham Company is also attractive. At the time of writing it is still cum. div., and at 103 gives a yield on last year's dividend of £6 8s. 6d.

There were only two appreciations in value last week—viz., the £10 shares of the Hongkong and Tuscan Companies gaining ¼ and ½ respectively. On the other hand, apart from *ex* div. reductions, Primitiva £1 shares dropped 1s. to 28s., and European £10 shares ⅛ to 13. The latter Company has recently notified its shareholders of proposals for alterations in the Articles of Association and for the conversion of the shares into stock to be transferable in £1 units.

It is interesting to note that the Aldershot Company's issue of £100,000 5 p.ct. perpetual debenture stock was considerably oversubscribed; the tenders ranging from £98 down to the minimum of £93 p.ct.

Among last week's dividend announcements for the past half-year were: Bournemouth original (sliding scale) shares 4½, making 9 p.ct. for the year (against 8½), and Chester 3¼ p.ct., making 5½ for the year (the same).

Coal Markets.

Reports from all the markets show little change in the situation. Continued heavy stocks everywhere are said to account for the absence of new buying, and business in consequence is very quiet. It will take a spell of cold weather to speed up the demand from the Continent, as exceptional precautions were undoubtedly taken after the experience of last winter. Fairly good inquiries are circulating, which may eventually bring new business, but at present the forward position is extremely slow.

On the Newcastle market, coking coals and bunkers are weak; the former being at the moment no better than 14s. 6d. to 14s. 9d. f.o.b. for good makes. Wear special gas qualities are holding their own at about 17s. f.o.b., with bests at 16s. 6d. Seconds, however, are easy at 14s. 6d. to 15s. Very quiet conditions prevail also in Yorkshire markets, and export demand, both for prompt and forward, is very quiet. Approximate f.o.b. shipment prices are quoted as 17s. 6d. to 18s. for screened gas, 17s. 3d. to 17s. 6d. washed trebles, 16s. 6d. to 16s. 9d. washed doubles, and 15s. to 15s. 3d. singles.

Gas coke demand is poor, and business quiet at about 22s. to 22s. 6d. in all markets.

Overseas Opportunities.

[From the Board of Trade Journal.]

Morocco.

Coal-Handling Plant for the Port of Casablanca.—The Acting British Consul at Casablanca reports that the Direction Générale des Travaux Publics is calling for tenders, to be presented in Morocco by April 30, 1930, for the supply, delivery, and erection of coal-handling plant for the Port of Casablanca. Firms desirous of offering plant of British manufacture can obtain further particulars of this call for tenders upon application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W. 1. (Ref. A.X. 9156.)

Trade Notes.

"The Harco Magazine."

We are pleased to see that Messrs. Harvey & Co., Ltd., of Woolwich Road, S.E. 7, have introduced a works magazine, entitled "The Harco Magazine" (a copy of which has been sent to us), which is to be circulated throughout the works. It is a bright and interesting publication, and has been brought out with a view to extending the spirit of goodwill and co-operation between the management, works departments, and staff generally. It will also form a link between the firm's London works and their others in the Provinces and Dominions.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 24.

The prices of tar products remain unchanged.

Creosote for export is 6½d. to 6¾d. per gallon f.o.b.

Pitch is 47s. 6d. per ton f.o.b.

Pure toluole is 2s. 5d. to 2s. 6d.; solvent naphtha, 95/160, about 1s. 5d.; pure benzole, about 1s. 11d.; and pyridine bases, 3s. 9d., all per gallon.

Tar Products in the Provinces.

Feb. 24.

The average prices of gas-works products during the week were: Gas-works tar, 21s. 6d. to 26s. 6d. Pitch, East Coast, 46s. f.o.b. West Coast (f.a.s.)—Manchester, 40s. 6d. to 41s.; Liverpool, 44s. to 45s.; Clyde, 44s. to 45s. Toluole, naked, North, 1s. 7¼d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3½d. to 3¾d.; low-gravity, 1¼d. to 1½d.; Scotland, 3½d. to 3¾d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 4d. to 2s. 5d. prompt. Naphthalene, £12 to £14. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Tar Products in Scotland.

GLASGOW, *Feb.* 22.

Business continues very quiet in Scotland at the present time. Refined tar is not moving in such quantities as hitherto, but the present weather conditions make all road work impossible. Prices are substantially as last quoted.

Pitch.—There is a continued lack of demand, and values are nominal at about 47s. 6d. to 50s. per ton f.a.s. Glasgow for export, with a premium of about 5s. per ton for home trade. Stocks remain low in this area.

Tar quotations remain firm at 4d. to 4½d. per gallon *ex* works in buyers' packages; but orders are scarce at the moment.

Creosote.—There is little or no business passing at the moment. B.E.S.A. specification is 3¾d. to 4⅛d. per gallon; low gravity, 3d. to 3¼d. per gallon; neutral oil, 3d. to 3¼d. per gallon; all free on rails works.

Cresylic prices are as follows: Pale 97/99 p.ct. is 1s. 8¾d. to 1s. 9¾d. per gallon; dark 97/99 p.ct., 1s. 7¼d. to 1s. 8¼d. per gallon; pale 99/100 p.ct., 1s. 11½d. to 2s. 0½d. per gallon; high boiling, 1s. 10d. to 1s. 11d. per gallon, all f.o.r. works in bulk quantities.

Crude naphtha is scarce, and the value may be taken at about 5½d. to 6d. per gallon free on rails works.

Solvent naphtha prices are steady at 1s. 2½d. to 1s. 3½d. per gallon for 90/160 grade, and 1s. 0½d. to 1s. 1½d. per gallon for 90/190 grade.

Motor benzole remains steady at 1s. 6½d. to 1s. 6¾d. per gallon f.o.r. works; but orders are not so numerous.

Pyridines are neglected. 90/140 is 4s. 3d. to 4s. 6d. per gallon; 90/160, 3s. 3d. to 3s. 6d. per gallon; 90/180, 2s. 6d. to 2s. 9d. per gallon; 90/220, unsaleable.

Benzole Prices.

The following are considered to be the market prices at the present time:

	s. d.	s. d.	
Crude benzole . . .	0 10 to	0 11	per gallon at works
Motor ,, . . .	1 5½ ,,	1 6½ ,,	,, ,,
Pure ,, . . .	1 10 ,,	1 11 ,,	,, ,,

Contracts Open.

Coal.

The Gas Committee of the Borough of East Retford invite tenders for the supply of coal. [See advert. on p. 600.]

Annfield Plain Gas Company.

The annual report of the Annfield Plain and District Gas Company states that the total receipts for the last year amounted to £6620, against an expenditure of £4596, leaving a balance to be carried to net revenue of £2024. After providing for interest on loans, writing off £2556 for special repairs, and transferring £621 to renewal fund, there remains a credit balance of £409 to be carried forward.

Joint Gas Conference at Birmingham.

The Joint Gas Conference at the British Industries Fair at Castle Bromwich, attended by members of the British Commercial Gas Association, the Institution of Gas Engineers, the National Gas Council, and the Society of British Gas Industries, was opened in the new conference room on Tuesday morning, Feb. 18. At the outset the chair was occupied by the President of the Conference, Mr. HENRY WOODALL, M.Inst.C.E.

There was an official welcome to members by the Deputy-Mayor of Birmingham (Alderman W. Byng Kenrick) on behalf of the Corporation, and by Mr. Percy Plant (Chairman of the Fair Publicity Committee) on behalf of the Fair.

Alderman KENRICK said not only was Birmingham greatly interested historically in their industry, but the municipality was also engaged in carrying on the largest provincial gas undertaking in England and Wales. It was unnecessary to remind them that the original gas plant of Murdoch was installed in the Soho Foundry of Messrs. Boulton & Watt, now within the boundaries of the City, some 120 years ago, and that fifty years ago Birmingham launched out as a city in the enterprise of purchasing and carrying on the undertaking for the manufacture and distribution of gas. He supposed he was addressing persons who more than others had been told not only that they were obsolescent and expiring, but that they were dead, and would have to make way for improved and more deserving enterprises carrying on a similar class of work; and yet he found them not in the least discouraged, but very much alive. He supposed one of the reasons for this had been not merely the intrinsic excellence of the industry which had as its object the purpose of making the most economical use of the great resources of the coal pits—which should be an inspiration to anybody—but the fact that from early days, owing to the vision of pioneers, they had had clearly before them the view that their occupation was an important public service, and that their method of approach was to find out what their clients wanted, even before they knew they wanted it, and then to supply it in the most economical way. In this way they were a good example to many of the manufacturers. It was a lesson to them of the intelligent anticipation of the needs of their customers and of the supply of faithful and honest products for their needs. They had a certain measure of government control, but they were not open to foreign competition. That at least had given them a certain assurance towards their problems and a certain security, of which they had made full use. He was there to congratulate them upon the way in which they had made the best possible use of the position before them. Development had been made in the gas industry by applying technical education; and as a result they saw that the gas industry throughout the country was constantly recording, not decreases, but increases, in sales.

Mr. PERCY PLANT said that the Fair was growing like a snowball, and was going from success to success. He believed the continuity and the permanence of the Fair were now definitely assumed. It was going to be, if it was not already, the greatest national trade fair that had ever been organized in the interests of British industry. He thought it could easily be described as a creator of export trade, and he believed it was the only possible solution which had been put up to cure unemployment. It was gratifying to know that in the Gas Section the industry was taking a united and increasing interest in the Fair. In 1928 the floor space occupied by the gas industry was 16,000 sq. ft., but to-day the actual stand space was 23,000 sq. ft. He congratulated the industry on the wonderful show they had put up. He believed they were the first to initiate what was now a most successful grouping of their particular industry, and he believed it would be followed by other trades. It was due to the industry that the extension of buildings had been brought about, because it was the result of their conference held last year to run concurrently with the Fair, that this conference hall was built.

He congratulated them on their national co-operative advertising scheme, and he thought it was excellent that their conference was to discuss the marketing of their commodity. They had heard much about salesmanship; and he thought it was time they gave their salesmen a little more encouragement, instead of creating a depressing atmosphere. The salesmanship was there, and would be brought out by that encouragement. He knew they had competition, but this was to the good, and he liked to think of them as pro-gas and not anti-electric.

The CHAIRMAN in expressing thanks for the welcome which had been extended, said Birmingham was almost a Mecca for gas men, and some people seemed to regard it almost as the home of the gas industry. Birmingham teemed with trades and industries of great variety and importance. The enterprise of the Chamber of Commerce in organizing that Fair was what one would expect from such a progressive business community, and it was at the same time refreshing to see that the spirit of enterprise so greatly needed throughout the country was still inherent in its people. Some depression existed in this country; the industry they represented, however, was not depressed, though it might well be if they allowed State-aided competition, coal difficulties, and other troubles to distract them unduly from their efforts to get on with the development of their own business.

The administration of the gas undertaking of the Birmingham Corporation had been a model of what such administration should be, and he spoke from personal as well as public knowledge. Their various works had always been up to date, and every improvement had been tried and tested. Their public lighting was very fine, and the work they did in connection with the commercial use of gas was greatly to the advantage of themselves and of the industry. One thing he rather envied the Gas Department was that it had fair dealing; and if gas was the best for any particular purpose, it had its chance. In some of the undertakings over which he presided they found that, when electricity was run by the local authority, they were not given a fair deal. The part that the Birmingham Gas Department, under the able direction of Mr. A. W. Smith, played in practical co-operation with manufacturers in the adaptation of gaseous fuel to industrial processes, and the splendid research work constantly carried out in the laboratories under the supervision of Dr. Walter, were matters of which the whole industry was justly proud. They also appreciated the ready way in which the Department placed its great knowledge and experience at the disposal of those whose opportunities were not so great.

Sir ARTHUR DUCKHAM, G.B.E., K.C.B., said he joined with the Chairman in his appreciation of the high position in which Birmingham stood in regard to the gas industry. Birmingham had certainly shown a lead to the industry in two ways, which meant much to them in the future—first in the sale of industrial gas, and secondly in the sale of smokeless fuel. Work begun in Birmingham before the war was continued during the war, and great service was rendered in the manufacture of munitions. This was continued in an intensified form after the war. He knew that in Birmingham they felt they had just commenced their service to the community in this matter of the sale of gas. Efficient production meant a lower price for gas, and low-priced gas meant a greater sale for industrial purposes, and this in turn meant a low price for all consumers. Birmingham had also shown the way in regard to smokeless fuel for the house. It had been demonstrated that such fuel was available, and was of a satisfactory character for the needs of the community, in the specially prepared fuel which was sent out. It was along these lines that they looked to the future for the reward for their service in the carbonization of coal and for the supplying of products to industry. The assertion that the gas industry was finished was a parrot cry which had been heard for many years, but to-day the industry was financially satisfactory, and stood as high as, or higher than, any industry in the country. They felt that they had only just begun their development. All those connected with the industry were imbued with this feeling, and it would carry them through to greater service and to greater success.

GAS LIGHTING.

The Conference then proceeded to a discussion on "Gas Lighting," which was introduced by a paper on this subject by Mr. F. J. GOULD. The paper was published *in extenso* in the "JOURNAL" last week. Sir ARTHUR DUCKHAM occupied the chair.

DISCUSSION.

The CHAIRMAN said it was natural that, in discussing gas lighting, that they should talk of the competition between gas and electricity. Mr. Gould had mentioned that in one of the Birmingham papers on the previous day there was a statement that electricity was the focus of industrial development, or words to that effect. Well, a focus was a very small point, and those connected with the gas industry were a little more general and generous. One of the objections to electricity was that it was a greatly concentrated force. Talking to a gas engineer recently, he suggested the use of some electrical apparatus, but he replied he would not have any such apparatus in his works. He (the speaker) pointed out that he had a telephone, and he did not see how he could run a gas telephone. Sir Arthur added that he was sure there was room for these two great forces and great services for the public. There was no doubt that electrical development had caught the fancy of the public; it was considered wonderful largely because it was so inexplicable. They could not help being impressed by the many

uses to which electricity could be put in connection with the wireless, Röntgen rays, X-rays, and so forth; but they must feel that a product which meant 85 p.ct. loss of the potential energy in coal before it was passed to the consumer must be at a great disadvantage when it was being re-used for the purpose of heating. This was a fundamental question between gas and electricity, and it would be a very different story if the electricity industry was able to get an efficiency of 50 p.ct. When they came to lighting, whether in the street or in the factory, they found gas had many advantages; but where the lighting was particular and concentrated, then electricity had certain advantages. In street lighting there was no question that gas held the field. About two years ago he went through Whitehall and Oxford Street with the head of an electrical undertaking, who said: "This is marvellous; it is wonderful electric lighting." The speaker pointed out that it was gas lighting, but his companion would not believe it until they had got out of the car and the fact was demonstrated. Outside the Town Hall in Birmingham there was lighting than which there was none better in the world; and in Germany they saw the same sort of thing. Again, those who lived in London must have realized that the high-pressure gas lighting penetrated the fog and gave better lighting than any other form. It was always the gas lamp which they could pick up first.

Again, for shop lighting they found there was no better means than gas, with its absence of glare and its diffusion of light. Then they came to the home. To the detriment of his pocket, his house was lighted by electricity because his rooms were fairly low and he liked to turn a switch on and off. His bill was high at the end of the year, as he was in one of those districts where he had to pay about 9d. a unit for his lighting. His gas cost him about 3s. or 3s. 6d. per 1000 c.ft. He changed four points in that house from electricity to gas—in the hall, the landing upstairs, the kitchen, and another big passage. He put four sets of gas burners in, and the saving in a year on his bill was between £8 and £9, which seemed to him considerable.

He built recently some cottages for his gardener and chauffeur, and they both said they would want substantial rises if he put electrical fittings in the house. They felt they could cook cheaper by gas, and they both chose gas for their houses. He thought they were right; for the working-class population gas was a better servant than electricity. The lighting load was a very important matter, and Mr. Gould had rendered great service by bringing it forward. He had also mentioned the matter of buying British fittings. He had always preached the gospel of "Buy British;" and if they all did this, they would have much less unemployment.

Mr. R. J. Milbourne said he agreed there was apathy in some portion of the industry with regard to the lighting load. They as an industry had now rendered important service to the community for over a hundred years and they must not overlook the fact that the very foundation on which the industry had been built was the lighting load. For the ordinary sized domestic house gas was the best illuminant, and there were many houses of eight to ten rooms that could be lighted more successfully by gas than by electricity, and much more economically. Wherever electricity was installed as a substitute for gas, their competitors had undoubtedly got in the thin end of the wedge; and they would be foolish not to imagine that they would go forward and use this as an introduction for installing cookers and other apparatus. There was no doubt that electricity was trying to supersede gas in its entirety. It was absolutely necessary that gas should have a maintenance system, because very few people who used gas knew how to burn it. A better display might also be given in most of their showrooms. In some places things were huddled together, and it was impossible for a would-be consumer to appreciate the style or to come to a conclusion as to whether a particular design would suit particular requirements. Another important point was the switch, to which the industry was undoubtedly looking forward, which would do away with the by-pass.

Mr. F. C. Briggs (Dudley) said he wondered if the apathy of which Mr. Gould spoke really existed when they had such a gathering as they had that day. Apathy, it might be said, also existed in regard to heating and cooking; they might go into some small provincial areas and wonder if gas was alive at all. In places like Birmingham and London there was no apathy. With regard to workmen's dwellings he agreed that workmen could not afford to pay for two services. It was against the national interest, because both became unremunerative. As to decorations, he had found that in Corporation houses there was no difference in the cost of decorations whether the houses were lighted by gas or by electricity. The dirty ceiling was in the living room, and it was the heat of the room which made the ceiling dirty. He lived in a modern house with gas and electric light; and the dirtiest ceiling in his house was the bathroom, which was the warmest room, and it was lighted by electricity. Mention had been made of cluster burners, but he suggested the description superheater as being preferable. As to renewals, he had 15 electric bulbs in his house, and in 2½ years he had only renewed two bulbs. He did not think the renewal of electric lamps was a serious item. Factory lighting should give them a good load, but there were cases where it was extremely difficult, and especially where there was a large amount of dust. He agreed with Mr. Gould entirely in regard to public lighting. Here gas had all the advantages.

Mr. H. E. Copp (Hull) remarked that there were insidious methods of charging for current which gave the impression that it was going to cost a halfpenny a unit; but when they took into consideration the fixed charge on rateable value it was somewhere in the neighbourhood of 5d., and yet the consumer thought he was only paying a halfpenny.

Mr. T. P. Ridley (Newcastle) said there was not the apathy which had been suggested. Practically all undertakings were very keen on this lighting load and knew its value. After the campaign was launched by the electrical undertakings in 1926, they issued a circular to every employee showing it was his individual duty to do what he could against it. They gave the particulars of tariffs, and so on, and urged them to tell the public about the good points of gas. Of 15,000 houses, they found that, in 4000, gas occupiers had practically committed themselves to take electricity. They regained half of that 4000; and they followed it up, and the electricity propaganda was broken in March, 1928. It was a hard fight, but it was worth it. With regard to public lighting, they had an excellent case, but they had an electrical atmosphere in their local councils. In their own instance there was a project for illuminating an area; and they guaranteed to give better lighting for less money; but they got no reply. It was galling; but they had to fight it. He hoped the manufacturers of burners would do all they could on the lines of research to give them greater efficiency for public lighting, so that they could stand up against the competition they had to meet.

Mr. F. W. Goodenough, C.B.E., said that where there was apathy it existed in regard to the whole of the gas business. There were 1400 gas undertakings in the country, and it was the progressive undertakings who came to meetings; but there were plenty which were unprogressive, and were the greatest menace to the industry. He knew of no leaders in the industry who were apathetic in regard to gas lighting. In their advocacy of this they had to differentiate between those services for which it was suited and those for which it was not. The great point in regard to lighting was maintenance, and the service to the customer. Talking of overseas customers, the Duke of York had said: "If we cannot satisfy them, we perish." He thought this was a motto which gas men should keep in the front of their minds all the time. In a large number of cases there was no attempt to maintain consumers' gas lighting; and if they neglected their obvious duty in that way, they must not expect anyone, by advertising or by other means, to save them from the disaster that was going to befall them. He thought it was wrong to say that the electrical atmosphere in the country was produced by the Press, because the newspapers would publish anything that was new, and electricity was newer than gas. Politicians of all parties had been fighting with one another to gain public favour by saying the wonderful things they were going to do by supplying cheap and abundant electricity. This was the great difficulty they were up against at the present time. There was no party that was not pro-electric. It was no use blaming the newspapers; as long as they had electrical schemes started up and down the country, the newspapers would publish this as news. If they had a Labour majority on a Council, it was almost certain they would vote for electricity, because of class influence and the feeling that what the rich woman had the poor woman should have as well. They had to prove to the Labour people that it was in the working woman's interest that she should have gas and not electricity. "The all-electric house for everybody;" they might as well say "the all-stalls theatre for everybody." They had to realize that all these influences existed, and they had to do what they could to influence public opinion. If they did this, they could hold a good deal of their gas lighting.

Mr. Henry Woodall said they all agreed that public lighting by gas was as good as, if not better than, any other kind of lighting. A large number of people were unaware of the extent to which the best lighting in their great cities was done by gas.

Major Wright remarked that, in Swindon, as fast as they laid a cable they cut off the gas, but, notwithstanding this, he believed there was a great future for gas.

Mr. W. J. A. Butterfield said that, in advocating gas for lighting purposes, he thought it would be as well to get away from price comparisons. With all the weird methods of charging for electricity, it was very difficult to compare prices. Gas lighting should be advocated because of its trustworthiness; gas lighting did not fail, as did electric current. It should also be advocated on hygienic grounds, and because of the absence of glare. There was also the assistance which gas gave to ventilation. With electric lighting in a small room they got no warmth or very little, and they went on breathing a stagnant and germ-laden atmosphere.

Mr. W. J. Sandeman (Croydon) moved a hearty vote of thanks to the lecturer. He did not believe that apathy existed; where it did, it existed in regard to every branch of the business. He believed that the majority of undertakings were

EXHIBIT BY THE
BRITISH COMMERCIAL GAS ASSOCIATION
REPRESENTING THE GAS INDUSTRY
PINXTON COLLIERY
COAL IS THE FOUNDATION OF THE NATIONS WEALTH

LORD! MAYORS, LORD PROVOSTS, AND MAYORS PHOTOGRAPHED ON THE STAND OF THE BRITISH COMMERCIAL GAS ASSOCIATION.

running efficient maintenance systems and looking after the lighting side of the business.

Mr. ROBERT WATSON (Doncaster), in seconding, said he hoped that much that had been said that morning would materialize in deeds. There was undoubtedly an electrical atmosphere among members of their local councils, and in the "Municipal Journal" he found many references to electricity, but not a single reference to gas for lighting purposes.

Alderman J. H. LLOYD (Chairman of the Birmingham Gas Committee), in proposing a vote of thanks to the Chairman, said he hoped no one would go away with the idea that the gas lighting in Birmingham was what the Gas Department desired it should be. They were not permitted to do more because of the necessity of keeping down the rates.

LUNCHEON SPEECHES.

At a luncheon which followed the conference the chair was taken by Mr. HENRY WOODALL, and the toast of "The Gas Industry" was proposed by Sir ALEXANDER WALKER. He referred to gas as the "Cinderella" of the fuel industry, and said that, though there had been a lot of talk in regard to oil and electricity, he thought that, together with gas, each "had a place in the sun." He believed there was a great future for gas in this country. He did not know if they had done all that was possible in the way of research and in securing efficiency in regard to gas, but they certainly had not done it in regard to coke; and he suggested they should concentrate on this. A high-grade coke was the thing that the average English woman was looking for. She did not want to bother any more about paper and sticks, but a gas lighter, and coke containing less than 6 p.ct. of ash, would be appreciated. Having got this, they must tell the housewife, as well as the industry, what they had to offer. He believed that, if they could obtain a domestic demand for their coke and an industrial demand for their coal, the future was assured. They must also increase their gas load. Between ten and eleven o'clock at night and six o'clock in the morning their gas mains were not in use. They should ask industrial consumers to instal gasholders in their works, and give them a discount on all gas taken in that way between 10 p.m. and 6 a.m. That would enable them to maintain 100 p.ct. output throughout the twenty-four hours. He also urged that there should be a central body for research through which all the work should pass. It was done in America and on the Continent, and was a sound system.

Mr. WOODALL, in reply, said they realized they were an important and a progressive industry, and they had not failed to consider most of the things of which Sir Alexander had spoken.

Sir ARTHUR DUCKHAM proposed the toast of "Our Guests," and claimed that the gas industry was the most scientific producing industry in the country at the present time. They were always ready to learn new ways of doing things, and they were willing to share the results of their work with others in the industry.

Prof. F. W. BURSTALL, Vice-Principal of Birmingham University, responding, urged the industry to welcome the assistance of all those who were engaged in the teaching profession, and they would not find them "in the clouds, or highbrows." Secondly, he asked that the young men in this country should be given positions of greater responsibility. In the Englishman to-day they had magnificent material, and he had no superior in his knowledge, his energy, and even his moral qualities. He believed it would be better for the future of this country if they were allowed to take positions of responsibility in the early thirties, or even before. This was one of the things that must be done if this country was to retain its commercial equality with the great nations of the Continent and overseas. The ability and grit of this country was as great to-day as ever it was; and if they believed in themselves and in their industries, they would put up as good a fight for the commercial supremacy of the world as they did when their backs were to the wall in Easter, 1918.

WEDNESDAY'S PROCEEDINGS.

Mr. HENRY WOODALL occupied the chair at the conference on Wednesday, Feb. 19, and consideration was given at the outset to a resolution dealing with the Coal Mines Bill. The Chairman said they had three organizations who supported a resolution to be proposed, and it was thought that it would be wise to let it be known what was the opinion of these societies in reference to Part 1 of the Bill. He proposed the following resolution:

> That it is the considered view of the Joint Conference of the National Gas Council, the Institution of Gas Engineers, and the British Commercial Gas Association, that Part 1 of the Coal Mines Bill, which compels all coalowners to reduce their output—thereby increasing the price of coal—and which deprives consumers of their power to select suitable supplies of coal at agreed prices, is unfair to gas undertakings, and definitely inimical to the interests of gas consumers.

Mr. Woodall quoted an experience he had recently in regard to the same coal from the same pit. He was horrified to find that he was paying 33⅓ p.ct. less for coal for abroad than he had to pay for the same coal for England. The lower price which the foreigner had to pay was due to the bonus of 4s. per ton which was then in operation, and there was 1s. 4d. per ton on account of de-rating. They did not want this sort of thing to go on, and they did not want any Government to make regulations which would perpetuate these things. Most of those in the gas industry felt they did not want the industry interfered with, and he believed the bulk of the coalowners, and probably the miners who thought about the subject, would agree they were better left alone.

Mr. J. H. CANNING (Junior Vice-President, Institution of Gas Engineers) said the Bill inflicted grievous hardship upon the industry and upon consumers, but gas engineers as a body had a particular grievance, because for the last century they had been endeavouring, by improved processes, to reduce the price of gas, and if this Bill came into operation it would to a great extent render these efforts fruitless. It was unfair that the difficulties of the coal industry should be placed upon the

shoulders of consumers, and particularly of the public utility companies.

Mr. J. E. DAW (National Gas Council) urged that the matter should be considered on its merits.

Mr. F. W. GOODENOUGH, C.B.E. (Executive Chairman, British Commercial Gas Association) said he strongly supported the resolution. The Bill meant less sales of gas, while they were all out for more sales. Lower sales of gas meant more smoke instead of less, so that the Bill was contrary to the interests of the citizens as a whole.

Councillor J. POOLE (Warrington) said he did not want it to go forward that everybody supported that resolution. If the price of coal was increased, the housewife would buy less coal, so that there would be less smoke. The industries were crying out for assistance from the Government; and he thought the resolution was inopportune.

Mr. GOODENOUGH remarked that, as the result of the Bill, the coal industry would reduce the price of coal to householders and increase it to the gas industry, so there would be more smoke, not less. Coalowners could vary the price for the same coal according to the purpose for which it was used.

The resolution was carried by a large majority.

COMPARATIVE COST OF COAL, GAS, AND ELECTRICITY FOR HEATING, WATER HEATING, AND COOKING.

At this stage in the proceedings, Mr. A. H. BARKER, B.A., B.Sc., Whit.Sch., M.Inst.C.E., presented a report on this subject, publication of which we commence on later pages to-day.

DISCUSSION.

Mr. RALPH HALKETT (Sheffield) described the report as a most valuable and practical one. The comparison between coal and gas fires was most interesting when it proved that the continuous use of the gas fire cost twice that of a coal fire. None of their representatives would advise that it would be as economical to instal a gas fire as to have a coal fire if it was for continuous use; but for bedrooms and dining rooms, where it was to be employed intermittently, they had not the slightest hesitation in recommending its use. He thought Mr. Barker had taken rather a high price for gas—10d. a therm was rather high, and he thought 7d. or 8d. would be nearer the average; and this would reflect to the credit of the industry. He thought the hot water installation was most elaborate, and they would only find a small number of such houses in their various districts. They realized that coke was cheaper if it was going to be used continuously, but for intermittent use he was of opinion that the cost of gas was similar. He hoped the time would come when the price of gas would be so low that they would be able to compete more favourably with coke. In Sheffield they had a low price, and they had been able to obtain several installations of central heating by gas which were in continuous use. With gas down to 1s. per 1000 c.ft. they could compete with solid fuel. He was confident that in coke they had a commodity which, if it was properly graded, screened, and had not too much moisture, had a great future before it if they pushed it for household purposes, and would compete successfully with other forms of solid smokeless fuel.

Dr. E. W. SMITH (Woodall-Duckham Companies) said he had done some experimental work at home, and what had been done confirmed entirely the general conclusions reached by Mr. Barker. He viewed with suspicion the advocacy of panel brick flues, and thought that matter required thorough investigation before it was supported by gas engineers, though he knew they were working well in some instances. He did not think they should assess the value of a maid's time at so much an hour. The better way was to take into consideration the size of the house, and consider if they must have one maid or two. If they had coal fires throughout, perhaps they must have two. If they could dispense with one maid, there was a bigger saving than Mr. Barker had shown. The author had accentuated the question of jealousy between gas and electricity. It was not jealousy; it was a demand from the technical people for information as to what gas would do, and this arose from the extravagant claims made by other forms of heating. If the paper Mr. Barker had given was made into a text book with tips for salesmen, it could not be better used.

Mr. POTTERTON said the industry was to be congratulated upon having a man of Mr. Barker's eminence to interest himself in this subject. He did not see eye to eye with him as to the design of the domestic hot water supply system. He did not like the top tank. In the average house it would be better to have a cylinder only.

Mr. W. N. WESTLAKE (Exeter) drew attention to the fact that the electric radiator did not ventilate. This point must be borne in mind. One of the great advantages of the gas fire was the fact that it ventilated a room and kept the atmosphere cooler and purer than an electric radiator could possibly do. Taking the paper as a whole, he saw nothing to disturb the gas engineer. The picture the author had put before them was that, for heating, at any rate, gas and coke economically held the field; and they could go on pushing their business with complete confidence.

Mr. E. C. A. BLIAULT (Ruud Manufacturing Company, Ltd.) said they must realize that the speaker was referring to a larger house than was the average in this country. He would like to ask if he had any figures which showed the cost of gas for ordinary water heating in a house of average size where there was no circulator. He believed that, if they forgot the cost and applied themselves to the service side, that would do a lot of good.

Major WRIGHT (Swindon) said they were in a unique position in Swindon, as the largest employers of labour had their own gas-works. In an artisan town like that they got the best results from gas in the warm weather.

Mr. H. H. CREASEY (London) pointed out that on this matter it was the time factor which counted above all. He had an electric cooker for two years, current free, but he had the greatest difficulty in getting his wife and maid to use the electric cooker at all. When it was employed for continuous periods, the house was always in trouble. Some municipalities were endeavouring almost to force electric cookers upon working-class homes. Here the time factor was usually vital; eight to ten minutes' delay at breakfast-time might mean the workman losing his workmen's train, and perhaps losing a "quarter;" and if this occurred too frequently, he might lose his job. There was no question that electricity suffered in regard to ventilation. Mr. Barker had told them something they had heard for the first time from an authoritative source, and that was that electric radiators made ceilings black. Electric radiators were unhygienic. The dust that got on them—some, of course, on the elements—could not be removed by any kind of domestic labour, and they got burnt dust. An electric radiator gave high-temperature convected heat, but the modern ventilated gas fire did not; and if Mr. Barker had used a gas fire in the same room, he would have had ventilation and a hygienic source of heat.

The CHAIRMAN intimated that Mr. Barker would put his reply into writing.

LUNCHEON SPEECHES.

The members of the conference were entertained at luncheon by the Authorities of the Fair. The chair was occupied by Mr. R. C. RODGERS, who expressed the indebtedness they felt to the gas industry for the great help they had given to the Fair. In that work they were helping definitely to reduce unemployment in this country. They did not suppose they would achieve an immediate millennium, but they did assert that this was the only definite national effort being made to promote the sale of British goods. Everyone would recognize that to-day all was not well with Great Britain, and the only way to make Great Britain well was to make the country busy. This was the main object of the Fair, and they could do it by joint efforts better than by any other means.

COLLIERY MANAGEMENTS CRITICIZED.

Mr. HENRY WOODALL, in reply, suggested that, if the collieries had been satisfied with (say) dividends of 6½ p.ct. in the past, they would be in a better position to-day. He contended that if the collieries had managed their business in the careful way the gas industry had done they would be selling coal to-day at a lower price and making profits. He had examined the figures of to-day and compared them with those of fifty years ago. He found they were paying exactly 100 p.ct. more than half-a-century ago for their coal, but they were selling gas at the same price. This was a thing of which they might well be proud. He hoped the Fair would continue to be successful, for he felt it was doing very good work indeed, and work in which they would be very happy to assist.

THURSDAY'S PROCEEDINGS.

The members of the conference met on Thursday at the Queen's Hotel, Birmingham, under the Chairmanship of Mr. C. S. SHAPLEY, Leeds (President of the Institution of Gas Engineers).

The CHAIRMAN welcomed the new Secretary of the Institution, Mr. J. R. Willis Alexander.

Mr. W. B. McLUSKY then read a paper on "Residual Products and their Effect upon the Price of Gas." This was published in the "JOURNAL" last week, and was the subject of comment in our editorial columns. We then suggested that the phrase "the gap is widening between the gross cost and the net cost of coal" was not correct; and at the meeting the author modified this to "the gap is widening between the gross cost of coal and the net receipts from residuals."

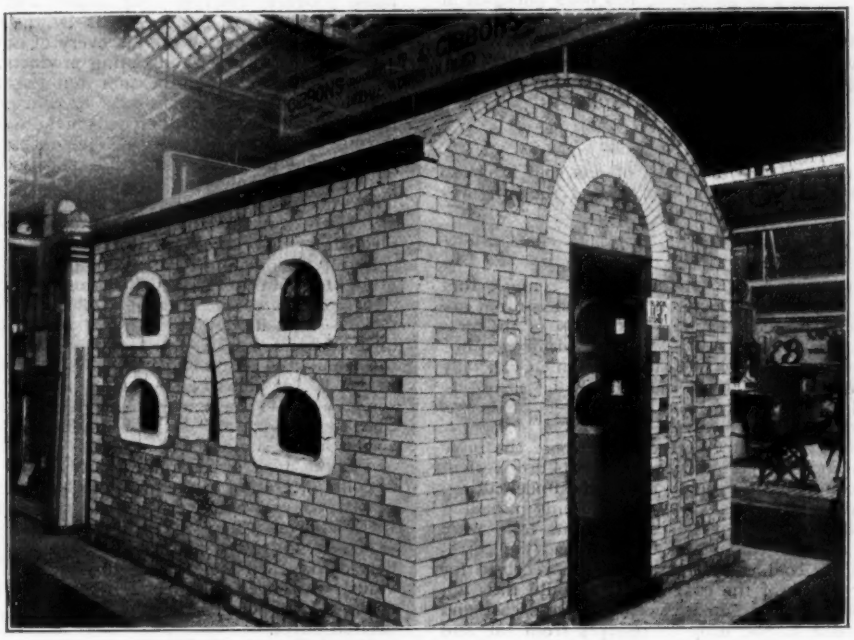
Mr. A. W. SMITH (Birmingham) proposed a vote of thanks to Mr. McLusky. The author, he observed, had always something enlightening to say, and his active brain had been of considerable help in several directions, particularly in regard to gas charges. He (Mr. Smith) thought the paper came at an opportune moment, if only to let the world know what they had to face in the way of increased costs. The Chairman of his own Committee was asked in the City Council recently why it was, with the modern adaptation of plant and the reduced number of men employed, that the price of gas was not very much less than it was at the present time. His reply was on the lines of Mr. McLusky's paper, that the net cost of

coal to the undertakings to-day compared with pre-war was more than three times as high. On the previous day Mr. Woodall had referred to the prices he paid for coal fifty years ago and those charged to-day. In 1880 they received 86·28 p.ct. of the cost in return for residuals, but to-day the price of coal was 2½ times higher than then, and in September the return was down to 47 p.ct. He wanted to take credit for the fact that the gas industry had not stood still. They had had to turn to greater efficiency and economy in production; and but for this their price of gas would have been much higher than it was. If the coal industry had made the same progress in the efficiency of their production and in the utilization of modern methods, they would not be in the parlous condition they were to-day. But they were improving, and attaining a more scientific development of their pits. It was only recently, however, that they had turned to better production and had realized the desirability of developing their sales. They all knew the tremendous difficulties they had to face in world-wide competition; and it was only by real self-sacrifice that they had been able to maintain the prices even as low as they were to-day.

In Birmingham, continued Mr. Smith, they were very keen in regard to the development of coke sales. They had spent an enormous amount of money in screening and grading machinery, but they had developed their sales, and a goodwill for coke second to none in the country. They would appreciate this when he said that, of 400,000 tons of coke produced, 95 p.ct. was consumed within ten miles of their works. They used to have a comparatively small sale of coke, and the rest went to London to be sold at any price. Now what was sent to London was sold at a higher price than London coke itself. If they looked after their own products and developed the goodwill of surveyors, and got them to utilize road tar more and more, they might gradually retrieve their return from residuals, until they arrived at the conditions existing in the happy days when they had an average return of over 80 p.ct. of the cost of coal.

Mr. H. H. GRACIE (Edinburgh), in seconding, observed that he agreed with what the author had said, but he thought they ought to add that, though the calorific value of the gas had been reduced, the efficiency had been very much increased, and therefore the public were getting better value for their money to-day than in past years. There were some very striking variations in the amounts received from residuals. They got about 70 p.ct., and even with this the net price of coal was down between 4d. and 5d. In recent years their net price of coal had shown a steady decrease. This was due to the higher yields per ton, the modern plant, and the selection of the most suitable coals for gas-making. They could maintain that position if they were left alone in regard to coal prices. The figure of 15d. for repairs and maintenance was, he considered, an outside figure; 4d. or 5d. might be more equitable. The question of coke from outside undertakings was a serious one. Each undertaking ought to carry its own burden and should be able to dispose of its own coke.

The CHAIRMAN pointed out that the influence of the revenue received from residual products had a most important bearing on the price charged for gas; in fact, in a great measure it controlled it. Chart No. 1 revealed the fact that the net cost of coal per 1000 c.ft. of gas sold varied from 0·20d. in 1913 to 14·88d. in 1922 and 6·89d. in 1928. In other words, the income from residual products in 1913 was 98 p.ct. of the cost of coal, as compared with 52 p.ct. in 1922—a difference of 14·68d. per 1000 c.ft.—and 57 p.ct. in 1928 (or a difference of 6·69d. per 1000 c.ft.). Whilst the cost of coal, including unloading and storage, had increased in 1929 by 109 p.ct., or 9s. 8d. per ton, over 1910, the net income from residuals had only increased by 83 p.ct., or 5s. 3d. per ton—a difference of 26 p.ct., or 4s. 5d. per ton. In Leeds the net income received per 1000 c.ft. of gas sold had varied from 29·31d. in 1921, the year of the coal strike, to 7·56d. in 1929. The income from coke had varied from £220,289 in 1921 to £66,692 in 1929; tar from £75,443 in 1921 to £22,874 in 1922 and £29,405 in 1929; liquor from £31,077 in 1921 to £2634 in 1928, while this year the income from liquor would be practically *nil*. These variations of income made it very difficult to stabilize the cost of production of gas, and were, in fact, reflected in the increased or decreased price charged to the consumer of gas. These increases were often adversely criticized by the consumer, as he did not understand the relationship of the revenue received for residuals to the cost of production. During the last two or three years it had been increasingly difficult to maintain the price of residuals, owing to the competition of the coking industry. In the past, America had taken a very large proportion of creosote made in this country; but they were now producing it themselves, and consequently the price now obtainable for this commodity was only about one-third of that previously obtained. With regard to liquor, the introduction of the synthetic process of manufacturing sulphate of ammonia had so reduced the cost of production that crude liquor was now practically valueless. Having regard to the importance of the residual products of the gas industry, every effort should be made to increase the sale both at home and abroad. At the same time the gas industry must pay strict attention to the quality of the commodities they sold—the ash and moisture content of the coke, and its grading; and the quality of the tar supplied for roads. Attention to these details would result in large sales of smokeless fuel for domestic purposes, while local authorities would



The above photograph shows the stand of Messrs. Gibbons (Dudley), Ltd., and Gibbons Brothers, Ltd. It was built by skilled men regularly employed by Gibbons Bros., Ltd., on gas, tunnel kiln, and furnace contracts. The refractory bricks and blocks used in the structure are manufactured by Gibbons (Dudley), Ltd. The exhibit contains interesting photographs and drawings of gas-works carbonizing plant, industrial heating furnaces, and tunnel kilns erected during the past eighteen months. Samples of metal parts and ceramic ware treated in Gibbons furnaces and kilns are also shown.

use British tar for British roads; and this would be of common advantage to the gas industry, the public, and the nation at large.

Prices Received for Residuals by the Leeds Gas Department, 1921-29

Year.	Coke.	Tar.	Liquor.	Total.	Pence per 1000 C.Ft.
1921	220,289	75,443	31,077	326,809	29·31
1922	161,065	22,874	1,352	185,292	15·83
1923	90,788	40.725	12,412	143,925	12·37
1924	111,153	52,727	11,627	175,507	14·33
1925	97,692	24,661	8,853	131,206	10·55
1926	74,722	24,583	6,075	105,380	8·14
1927	130,347	43,960	5,367	179,674 (strike)	13·16
1928	70,040	35,809	2,634	108,483	8·20
1929	66,692	29,405	3,753	99,850	7·56

Mr. H. E. COPP (Hull), in a written communication, said: Mr. McLusky points out that the yield of gas per ton of coal in 1920 was 12,222 c.ft. and in 1928 had increased to 14,225 c.ft., and then states that the difference between the two figures represents a saving of 2,879,000 tons of coal per annum. Thus, it would appear to mean, in other words, that, if the make per ton had not increased from 12,222 c.ft., 2,879,000 tons additional coal would have been used to meet the demand for 1928. It should be remembered, however, that this increased yield per ton of coal has been chiefly due to steaming in vertical retorts, and, therefore, to a large extent, has been obtained at the expense of the coke yield, and should be set against the value of the coals so saved.

In this connection it is interesting to turn to Statement "A," and take the averages of the figures given for coke saleable per ton of coal carbonized. The figures are as follows:

Horizontals only . . . . . 11·25 cwt. per ton
Verticals only . . . . . 7·592 " "

The average price received per 1000 c.ft. of gas sold is correspondingly lower for verticals. The averages of these figures are as follows:

Horizontals . . . . . 8·75d. per 1000 c.ft.
Verticals. . . . . 5·44d. " "

The foregoing is borne out by Mr. McLusky's remark that "the lower figures for coke sold per ton of coal carbonized are generally accompanied by extraordinary increases in the production of gaseous therms per ton." The yield of gaseous therms per ton obtained has an economic limit which can only be determined by each undertaking individually according to local conditions and type of plant. The highest yield of therms does not necessarily mean the cheapest gas.

It is interesting to note from Chart No. 4, where the price paid per ton of coal and the receipts from residuals are plotted, taken from the accounts of a typical Yorkshire undertaking, that in 1910 the price paid for coal per ton, including unloading and storage, was 8·84s., and gross receipts from coke were 4·75s., or 53·7 p.ct. of the coal bill, while in 1929 the corresponding price paid for coal was 18·47s. and that received for coke 11·15s., or 60·3 p.ct. of the coal bill. It would thus appear that the widening of the gap between the gross cost and net cost of coal is due to the drop in receipts from tar and ammonia.

Mr. T. F. E. RHEAD (Birmingham) said that what they wanted to do was to find some method with the vertical retorts of converting more tar into gas producing tar. This would be very useful indeed; and some of them were working on those lines.

Mr. J. H. CANNING (Newport), in a written communication, said: The gas industry is greatly indebted to Mr. McLusky for the pains he has taken in collecting and arranging, both in tabular and in graphic forms, the various statistics contained in his paper. The figures presented by him clearly show the danger of attempting to form hasty generalizations as to the cost of production of gas. Table No. 3, in which the comparative costs of coal and the price of residual products per 1000 c.ft. of gas sold are shown for the years 1913 and 1928 respectively, indicates that the figures for these two items have fluctuated in both directions. In some instances the cost of coal per 1000 c.ft. has increased by 40 to 50 p.ct., while, in other instances, reductions of almost equal magnitude have taken place. It is presumed that these reductions are due either to the installation of more modern plant or to improvements in working, and this clearly indicates the most effective contribution towards the bridging of the widening gap between coal costs and residual prices. The word "widening" is used advisedly, because, had the figures for 1929 been available, they would probably have revealed both increases in coal costs and reductions in the prices received for residuals, which would have the effect of considerably increasing the net cost of coal.

It is to be hoped that the immediate future will not bring into operation the provisions outlined in the Government Coal Mines Bill, which will certainly have the effect of still further increasing the net cost of coal, and thus penalizing gas undertakings and their consumers.

The figures quoted by Mr. McLusky also emphasize very strongly the necessity for doing everything that is possible, both by the maintenance of quality and by efficient marketing, to promote the sale of residual products. Much can be done in respect of coke by careful attention to coal blending with the view of producing a fuel as free as possible from both moisture and ash, with a reasonably low ignition temperature. In regard to the marketing of coke, most progressive undertakings have realized by this time that coke no longer sells itself, especially in districts where there is competition from coke oven coke. Regular canvassing of customers is necessary and, occasionally, a little tactful instruction in the best method of utilizing the fuel is very helpful.

Most of the difficulties in connection with the tar market would be solved if the Government's recommendation contained in the Ministry of Health Circular No. 1060, issued to Local Authorities, were observed, as it would ensure a very substantial increase in the quantity of tar bought for making new roads and for surfacing existing roads. The interests engaged in the sale of foreign substitutes are both powerful and influential, but, if the merits of tar as a durable and non-skid road making and surfacing preparation are supported by continuous propaganda, it should be possible to increase very largely the quantity of British tar used on British roads.

The prospects of the ammonia market are not bright, but it is possible that research may open a new outlet for this erstwhile valuable product; and here the importance of continuous research, in respect of all bye-products of gas manufacture, may be strongly emphasized. It is the patient and continuous experiment and research of our predecessors which have given these products their present value; and the only permanent way of enhancing that value is by the development and extension of their use by the discovery of new derivatives, or new methods of utilizing the existing products.

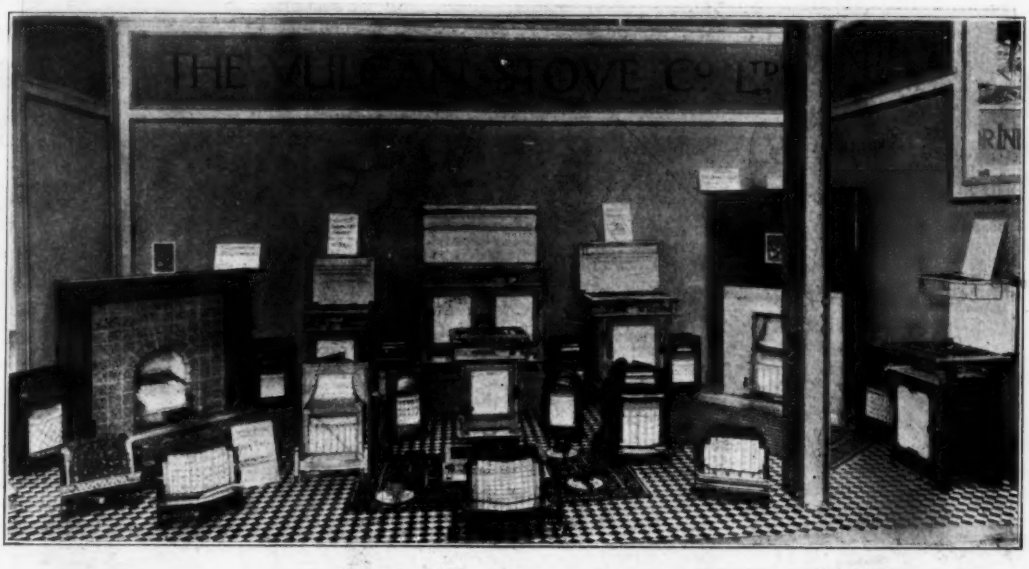
In conclusion it may be said that the diagrams prepared by Mr. McLusky cover, in respect of coal prices particularly, the most critical period through which the gas industry has passed during its century or more of existence. That it has successfully surmounted all difficulties encountered during the war and its aftermath is a tribute to its strength and stability. This success is all the more gratifying in view of the fact that, as clearly indicated by these graphs, the industry has never yielded to the temptation to profiteer at the expense of the community during serious national crises, such as those brought about by the coal strikes of 1921 and 1926. This clearly indicates the immense service rendered by gas undertakings; and it may be confidently said that, without this aid, incalculable hardship and loss would have been inflicted upon the population of this country.

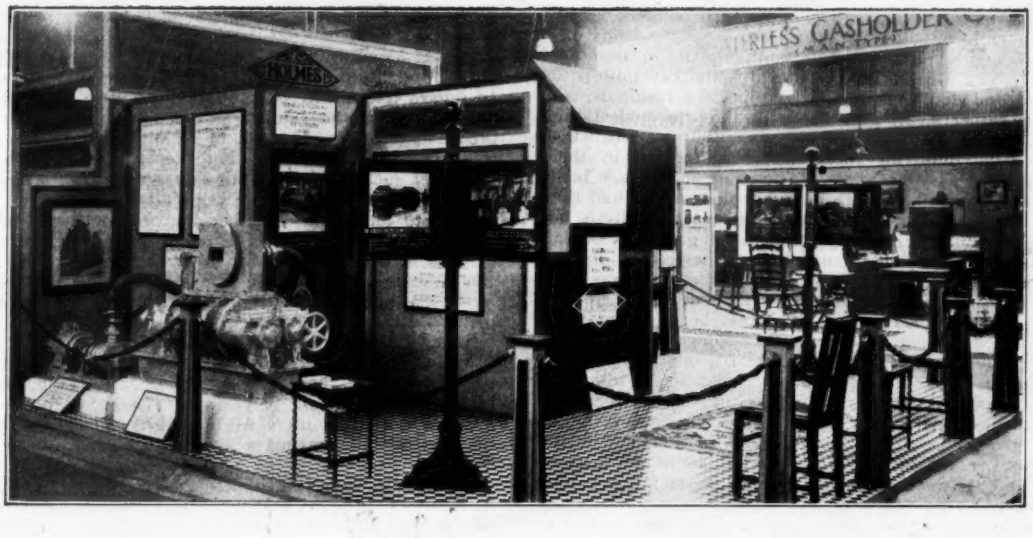
Mr. W. M. MASON (Manager, British Commercial Gas Association) said he understood from developments in Halifax that they had stopped the manufacture of coke and had reverted to the making of smokeless fuel. He thought this was one of the most important considerations in regard to the value of coke in relation to the price of gas. He thought that, if they ceased to use the word coke, and substituted "smokeless fuel," it would help very greatly in the sale of coke.

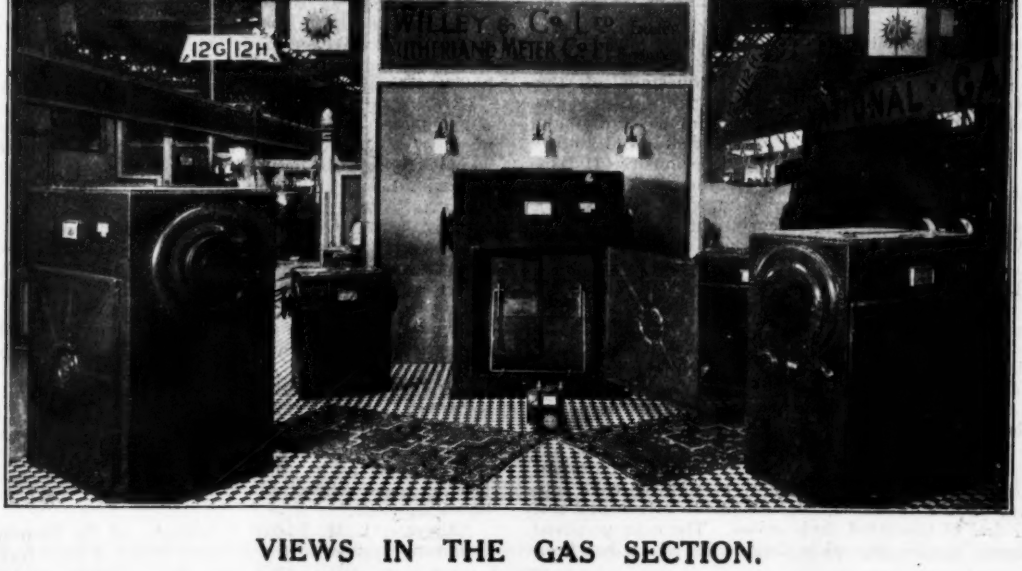
Mr. H. C. SMITH (Tottenham) said they had recently started developing their coke as high-temperature gas coke, as obviously it gave a higher temperature than low-temperature coke. [Laughter.] He was glad to say it was having the desired effect.

Mr. H. POOLEY (Leicester), in a written communication, said: I have read Mr. McLusky's paper carefully, and the author is to be congratulated on giving such a comprehensive survey of this subject in so small a compass. The opening is not very clear for, in my opinion, the slump of the residual markets is causing the net cost of coal more nearly to approach the gross cost, thus narrowing the gap between the two. Mr. McLusky no doubt means that the gap between the old pre-war and the present gross costs and net costs of coal, with increasing prices of coal and the slump in residual markets, will widen further. Percentage figures, too, are misleading, for if the cost of coal is doubled and the percentage receipts from residuals are constant in two periods considered, and if the make of gas per ton be also level, the net cost of coal per 1000 c.ft. is doubled. It is here where the gas industry has shown such great progress in the increased quantity of gas now obtained from a ton of coal, which we very largely owe to such pioneers as Duckham, West, and Woodall. This, however, is only obtained at the cost of a quantity of the coke for sale.

If Mr. McLusky is sorry for the Yorkshire undertakings, I do not know what he would say to the position of some of the Midland works which are situated far from a gas-coal field, but near enough to a coalfield which supplies cheap house coal and very cheap steam coal which makes it extremely difficult to dispose of the majority of the coke made locally—to say nothing of the surplus coke exported from Yorkshire. These works must be in the worst conceivable position, for, though they may not be so far from the gas-coal fields as are the seaboard undertakings, the fact is, in practice, that the cost for carriage by rail for the former is often far greater per ton than the freight cost of seaborne coal, and the coastal towns have the further advantage in that the price they receive per ton of surplus coke for export is as high as that received by the







VIEWS IN THE GAS SECTION.

A DECORATIVE EXHIBIT.

inland town for local sales; and the same handicap holds good for the marketing of pitch, creosote, and sulphate of ammonia.

In Chart No. 2 Mr. McLusky compares the expenditure on manufacture and distribution with receipts for residuals, and the result is rather striking. I imagine that the undertaking quoted has increased its make of gaseous output per ton, which in itself will account for most of the difference in these figures during the past five years. The chart shows how badly residuals have slumped since 1910; but it does more than this. It probably shows the position to be worse than it really is, for the effect of residual receipts on the price of gas must be calculated not on those receipts alone, but on the receipts in conjunction with the gross cost of coal per 1000 c.ft. of gas sold, which latter figure will be reduced as the output of gas per ton of coal increases. This position must be borne in mind when reading Statement A. If these be considered together, it is most probable that some of the lower receipts per 1000 c.ft. from residuals, and coke particularly, subtracted from the gross cost of coal will give lower net costs of coal per 1000 c.ft. than some of the much higher returns where coal and residuals are alone considered. Put in another way, as increases in the make of gas per ton of coal are reported, both the costs of gross coal and the receipts from residuals must fall per 1000 c.ft. of gas made.

I think the most serious matter we have to face to-day is that, with delivered coal costing us well over 100 p.ct. above the prices ruling in (say) 1910, whereas in the earlier period we were frequently able to get 75 p.ct. or more back from our net residuals, to-day the undertaking which obtains 50 p.ct. of the cost of its delivered coal from its residuals is fortunate; and, of course, in such a case the net cost of its coal is quadrupled. At the moment we suffer from overproduction of certain residuals, and, until we can either satisfactorily market or absorb these surpluses, the position must be adverse to our interests.

Mr. A. L. HOLTON (Manchester) remarked that, to those of them concerned with works costs, the question of the variation of residuals was a very serious one. Every gas manager must devise some means of getting a quick and accurate statement of his working costs. Coke sold to-day contained a great deal less moisture than previously. If they were getting a market for vertical coke, and then for some reason they had to switch on to horizontal coke, unless they were very careful with the moisture content they would be inundated with complaints. The main thing for domestic use was to keep the moisture down.

Mr. H. D. MADDEN (Cardiff) wrote: I think a great development can take place in the sales of residuals by the judicious use of showrooms. Also, the large number of calls the general staff pay to consumers' premises can effect excellent propaganda work to familiarize consumers with the use of small quantities of the different residuals produced. Taking the case of coke, in the first place this must be looked upon as a raw material when it leaves the retort. It must then be machine broken and graded to suitable sizes, and delivered by the undertaking in quantities at least as small as one hundredweight upwards. It is not good enough simply to sort the coke into different sizes as it is produced, because in the breeze and nut sizes a good deal of separated shale exists. The coke prepared for the domestic market should be large coke which has been screened and then broken and graded. By this means a good domestic demand will be made, and an increased quantity used, with a resultant enhanced value per ton of coal carbonized. In regard to sulphate of ammonia, we have found that, by the marketing of 7-lb. and 14-lb. bags, a good quantity of our production can be disposed of locally; and this is given prominence in our showrooms and literature. We also undertake to deliver such small quantities upon receipt of a postcard; and I may say that this service is greatly appreciated. The same applies to tar produced either for preservative work or path-making, and canned in 1, 2, and 5 gallon quantities, suitably labelled with instructions for use. Personally, I feel that much can be done by undertakings in this way, because, not only do we assist in supplying the consumer with his small requirements, but at the same time help to form public opinion in regard to the wide ramifications of gas service.

Mr. C. GOODALL (Chairman, Society of British Gas Industries) said that, though he was not a gas man, the question raised in the paper of the cleaning of coal was one which came into one's everyday life. All the points in the paper emphasized the necessity of starting with a clean coal, so as to keep costs down.

Mr. DAVID VASS (Perth) wrote: The results from Statements A, B, and C are very instructive. They assume, however, that all the returns are made on a common basis. Taking them in their order:

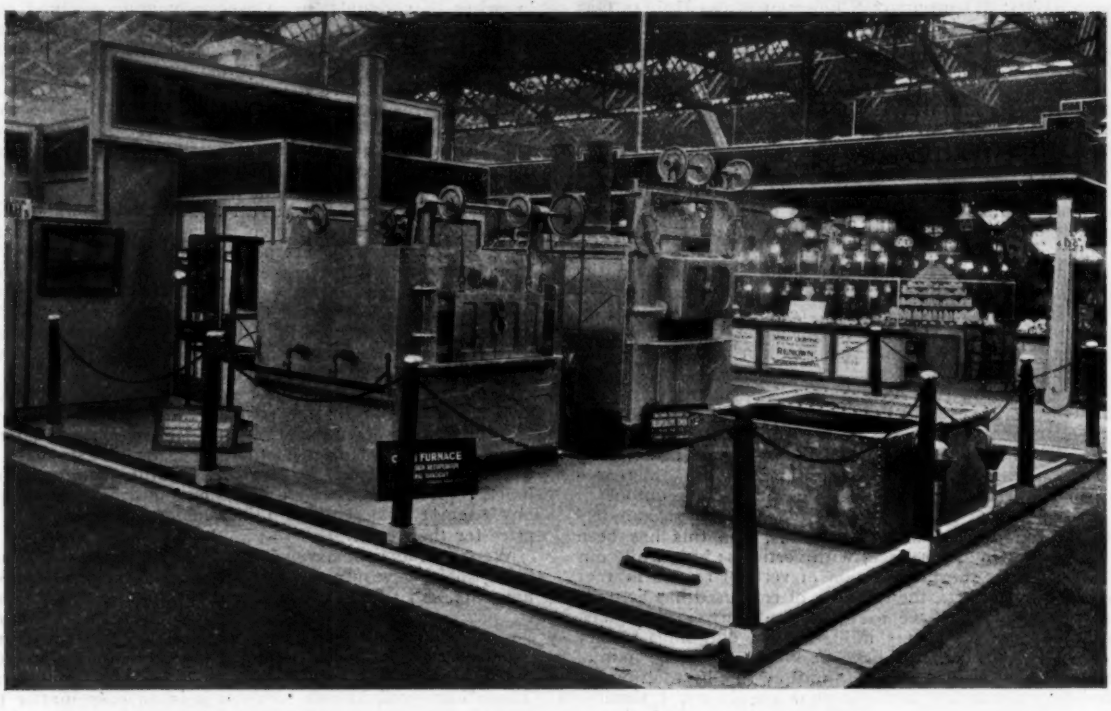
(A) *Coke.*—In our case the quantity produced for sale includes the amount used in our boilers for gas manufacture and for residual product works, and these amounts are charged to carbonizing and residual works respectively, at the current prices for such quantities, and the result brings out a good average weight of coke per ton of coal. Our proportion of breeze is rather high, and the market for it very limited; consequently our average money value for coke and breeze per ton of coal comes out rather low under the 1929 return, but we are hoping to improve this by reducing the proportion of breeze.

(B) *Tar.*—This return varies from £13 7s. to £33 14s. per 1000 gallons. Geographical position has some bearing on the question of price obtained, but with such a large difference we would require to be assured that costings are on the same basis throughout.

(C) *Sulphate of Ammonia.*—The returns vary from £2 15s. 5d. to £8 under the Sulphate of Ammonia Federation Scheme; we all get the same basis price at our works, *plus* allowance for excess ammonia and for friability. Admitting a variation in manufacturing costs, there must be some explanation of this remarkable difference. What is it?

Apart from these comments, I congratulate Mr. McLusky on the general trend of his paper that the industry, by improved methods of working, is counteracting the fall in value of residuals. For the future, I look for increased local sales of coke, and a better understanding all round as to selling prices on the tar market. For ammoniacal liquor and sulphate of ammonia we must look to the Sulphate of Ammonia Federation to assist us in procuring reduced costs for acid, which is forcing many undertakings out of the market, by running liquor to waste.

Alderman J. H. LLOYD (Chairman of the Birmingham Gas Committee) spoke of the pleasure which it gave him to be pre-



BIRMINGHAM GAS DEPARTMENT'S STAND IN THE INDUSTRIAL HEATING SECTION.

JOINT TESTING EXHIBIT OF THE RESEARCH AND TRAINING SECTION OF THE GAS LIGHT AND COKE COMPANY, WATSON HOUSE, AND THE INDUSTRIAL RESEARCH LABORATORIES OF THE BIRMINGHAM GAS DEPARTMENT.

sent, and of the importance of the subject they were discussing. It was one of the most important branches of their work, and required much study.

Alderman J. H. Waddington (Chairman of the Halifax Gas Committee) said that the question of residuals was wrapped up very largely with the term coke. Many years ago it was a problem of getting rid of coke because it was there, but to-day it was a valuable marketable commodity. There was a great deal to be said for the transfer of the name from what was associated with cinders to something associated with a valuable commodity. They had changed the name in Halifax, they had no coke to sell, and they had none in their place; but they had smokeless fuel, and he was proud to say they had a shortage at the moment. When he took over the Chairmanship of the Committee, coke was selling at 5s. and 6s. 8d. a ton. To-day it was smokeless fuel, and was worth 25s. a ton. Coal had advanced in value, and so also had smokeless fuel. In the last three years they had obtained at least fifty branch establishments—fifty shopkeepers who were anxious to retail it. They put it in 3d. bags, and people called for it in motor cars, and children going home from school took it with them—one, six, or ten bags at a time.

Mr. H. S. Ritchie (Falkirk) wrote: The figures given by Mr. McLusky are very interesting. Referring to his comments on Statement A, I do not think the price per ton realized for coke would be so good, especially in that part of Scotland between the Clyde and the Forth, were it not for the increased use of vertical retorts, consequently reducing the output of coke. In the case of Falkirk, we were making approximately 12 cwt. per ton of coal with horizontals, and this has been reduced to 5 cwt. (moisture free) with verticals; but, while our output of gas since the introduction of vertical retorts in 1921 has increased by 46 p.ct., the quantity of coal used has actually decreased by 28 p.ct. If we were working horizontals to-day, with an annual make of 345 millions, and obtaining similar "makes per ton," we should have to dispose of 21,800 tons of coke, instead of 4600 tons. If we multiply this by the number of undertakings working under similar conditions, I shudder to think what the price realized per ton of coke would be in the district.

In Statement B the price received per 1000 gallons for tar varies very considerably. In the two Scottish works where £27 and £22 respectively is received per 1000 gallons, I assume that these are where tar is distilled; but, on looking over the figures in the "Gas World" Analysis, I find that in one Scottish gas-works where tar is distilled they actually receive a lower price than other Scottish gas-works where the tar is sold crude. It is hoped to realize much better prices for tar in Scotland now that a Co-operative Scheme has been inaugurated.

Mr. E. B. Tomlinson (Birmingham) observed that the credits for coke were much about the same to-day per 1000 c.ft. as pre-war, and the same applied to tar; but for liquor they had gone down to one-tenth of what they were.

Mr. A. S. Nisbet (Paisley) wrote: Mr. McLusky has asked me to comment on the figures sent to him relative to the net cost of gas produced pre-war and now. The gratifying feature of the figure which I was able to give him is that, despite the increased cost of coal, the net cost of gas is to-day less than it was in 1913-14. One must remember that carbonizing methods have improved enormously in most cases. In 1913-14 I had horizontal retorts only, charged by the De Brouwer machine and drawn by hand. To-day I have a good setting of continuous verticals. And in comparing the years, allowance must be made for a lowering of calorific value by 10 to 12 p.ct. Whatever criticism may be made, I think the gas industry may fairly claim to have done its part in keeping down costs of manufacture, and to be doing its share of coal conservation by a progressively efficient use of the nation's greatest asset.

Mr. F. J. Edmonds (Waterford) urged that equal attention should be given to the quality of gas as to the quality of coke.

Mr. R. E. Gibson (Liverpool) wrote: I cannot find in the paper any reference to the effect of carburetted water gas manufacture on the figures relating to net coal (less residuals) given on Chart No. 3. Without due allowance being made, the figures relating to undertakings making carburetted water gas may be very misleading. In such cases high values are shown for net coal (less residuals), due to the fact that the only residual from carburetted water gas manufacture is a comparatively small quantity of oil gas tar. To make a fair comparison it would be necessary to take into account the whole of the costs, and especially the costs of manufacture (including repairs), which are, of course, much less than in the case of coal gas, and very often turn the scale in favour of carburetted water gas, more than compensating for the absence of residuals. There is also the saving due to the fact that the coke market is relieved, and better prices generally obtained. I thoroughly agree with the author when he says that an increasing number of people are interested in smoke abatement, and would use good smokeless fuel in preference to raw coal if that fuel was brought within their reach. I have found from personal experience that, if care is taken to produce coke of good quality with low ash content and free from moisture, there is no difficulty in obtaining permanent customers who will use it in place of coal in the open grate.

Mr. J. Ferguson Bell (Derby) wrote: The effect of the fall in prices of residuals, more especially ammonia and coal tar products, is seen in the balance-sheets of all gas companies now being submitted to shareholders at their annual meetings. This is graphically indicated by the excellent communication by Mr. McLusky. Chart 1 shows in a typical Yorkshire undertaking the receipts for residual products from 1910 to 1923, and the cost of coals followed in fairly regular sequence; whereas from 1923 to 1929 the gap widened, resulting in a much higher net cost for coals. Chart 3 indicates that practically the same difference appertains in all parts of the United Kingdom. In the Midlands, where I am better acquainted with the position, the average in four typical towns is, for 1913, for coals less residuals, 3·82d. per 1000 c.ft. of gas sold; whereas last year, 1929, the average net cost for coals is 7·06d. per 1000 c.ft., being an increase of no less than 85 p.ct. The large increase in the cost of coals is a very serious matter for gas undertakings, more especially as the gas industry is threatened with higher prices for coal as a result of the Government Coal Mines Bill now before Parliament.

It is stated that in the past gas undertakings have not paid an economic price for the coal used. This is surely a matter for the colliery owners. We have always paid the market price. At the conclusion of the disastrous coal stoppage it was over £5 per ton; and we are in the future willing to pay the market price. But we do most emphatically protest against any attempt to force public utility undertakings to pay a higher price for their coal.

We might as well complain that certain residual products are being sold below an economic price. This applies especially to ammonia—in fact, some gas undertakings are now compelled to pay chemical manufacturers to take their ammoniacal liquor, whereas formerly it was a substantial item of income. We know it is futile to attempt to obtain more than current market prices for our residuals. There is another aspect. Those interested in collieries say it is an easy matter to pass any increase in cost of coals to the gas consumers, but they forget that most gas companies' dividends depend upon the price charged for gas. Hence any increase in the charge due to an artificial price for coal would be a gross injustice to those who have invested their savings in the gas industry, and also to gas consumers, the bulk of whom are people of limited means.

The Chairman said that there was one aspect which had not been touched upon. In Leeds they had housing estates with 1000 and 2000 houses upon them. When he went round on a recent Sunday there was a smoke pall over each of these houses. This was due to the introduction of coal fires. There was such a thing to-day as an efficient grate lighted by gas. It was as cheap as an ordinary coal range, and they were helping gas to the extent of ¾d. for gas for ignition, and 4d. for coke (at 26s. per ton) for the whole of the day. He wanted this fact to sink into the minds of those responsible for housing estates.

Alderman Milne (Leeds) remarked that there was something better than changing the name of coke. When all was said and done, the material was coke. One of the things to which particular attention should be paid was the grading of coke. If they did this properly, there would be no need to change the name.

The Author's Reply.

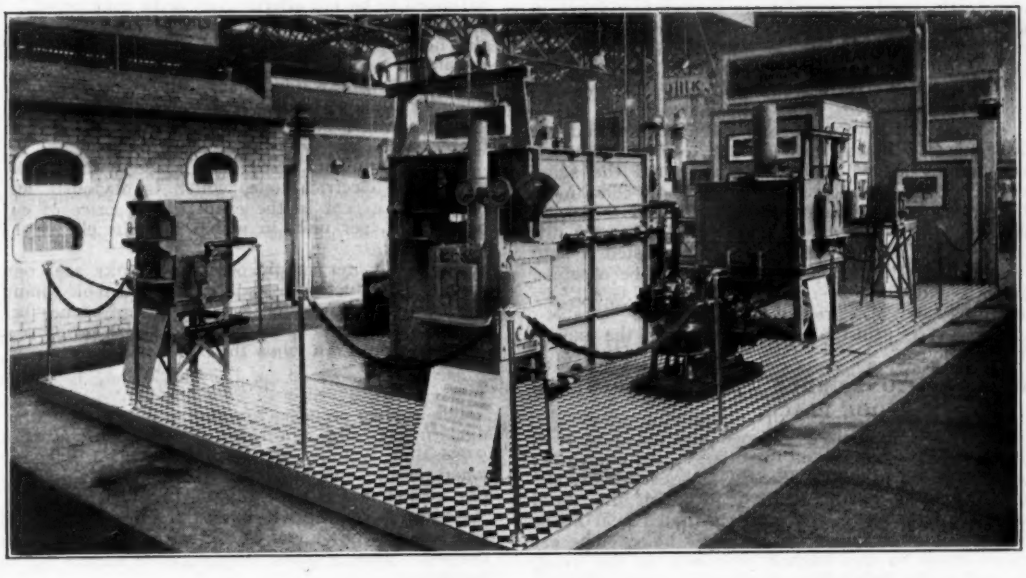
Mr. McLusky said he kept a record of everything Birmingham did. Mr. Smith sent him the accounts every year, and it was a great stimulus to look at what they were doing. Mr. Rhead had made an important contribution to the discussion. It would be a great thing if they could convert tar into gaseous fuel. They could not, he said, make good coke from bad coal. As to ash, when people bought fuel they liked heavy ash and small bulk. They always used coal containing a percentage of iron to give a heavy red-brown ash not exceeding 5 p.ct. They could not, he said, compare one district with another, but the thing he marvelled at was how the people on the south coast, so far from the coalfields, made gas so cheaply. They were under a great handicap, for they had to use oil; but when they reached a solution of Mr. Rhead's problem they would not have to buy oil from abroad, Scotland, or anywhere else. Oil was four times dearer than coal per B.Th.U. Complete gasification would not pay. If they were using coal, they had a hope that some day they would get as much for residuals as they paid for coal. If they had complete gasification, everything was gone.

Vote of Thanks.

Alderman Clark (Chesterfield) proposed a vote of thanks to the Chairman. The conference had given the public as well as themselves an opportunity of learning a great deal.

The Chairman paid a tribute to the Technical Press for their co-operation in fully reporting the proceedings of the November meeting of the Institution. He emphasized how much the three bodies concerned appreciated the work done by Mr. H. C. Smith and Mr. R. J. Rogers in connection with the meetings.

Mr. R. G. Shadbolt (Birmingham), seconded the vote, and it was heartily accorded; the Conference then terminated.



FURTHER STANDS IN THE GAS SECTION.

Comparative Costs of Fuels for Domestic Purposes.

By A. H. BARKER, M.Inst.C.E.

[From a Lecture before the Joint Gas Conference, Birmingham, Feb. 19.]

SECTION I.—METHODS OF EXPERIMENT.

These present observations, so far as they consist of opinions and not of numerical facts, may be taken as the well-considered personal judgments of one impartial and detached observer and the members of his household, not coloured in any way by prejudice or partiality, as applying to the special conditions in the particular house in which the experiments have been made, but which will probably apply to other similar cases.

The method of what I call "service comparisons," which is the method described in the present report, and which consists of running the same household equipped with different appliances, is not only very expensive, but very difficult and very inconvenient for the household which is the *corpus vile* of the experiment. It has been made possible for me to carry them out by the goodwill and intelligence of the members of my own household in conditions which are essentially very trying to the temper.

As it is impossible to expect any other private householder to tolerate this unceasing nuisance, I had my own house fully equipped for the purpose to my own designs, and my own household have endured the inconvenience for some four or five years during which these trials have been in progress.

I have also made similar experiments during five years in two tenements placed at my disposal some years ago by the London County Council Building Committee, in one of their housing estates. In this case the tenants who were experimented on were working class persons who lived rent free and were paid to allow themselves to be experimented on. These tenements were supplied only with solid fuel and gas, and not with electrical energy. It was only possible to make comparisons between houses served entirely by gas, and the same houses occupied by the same people under the same conditions, but with the domestic equipment entirely changed to an all solid fuel régime. Comparisons were also made between different proportions of gas and solid fuel. I presented a long report on the results, of which printed copies can be obtained from Mr. J. C. Walker, the Secretary of the "B.C.G.A.," by those who are interested, at a price of 6d.

The present report is principally concerned with the experiments in my own house.

SECTION II.—CONDITIONS UNDER WHICH EXPERIMENTS TOOK PLACE.

This house is of medium size, detached and standing in a garden, having an entrance hall and three large, and one small, living rooms, containing in all 13,728 c.ft., and seven bedrooms and landing, containing in all 15,622 c.ft., with the usual offices, a total of 29,350 c.ft. The total calculated heat losses on the ordinary basis are 87,000 B.Th.U. per hour. The experiments were made in the kitchen premises, in the living room grates, and in the two boiler chambers.

There were four adults and two maids normally living in the house, and one or two occasional visitors for week-ends and the like, and a gardener living out. No laundry work was done in the house, except occasional washing of light articles too valuable to entrust to a laundry.

The whole house is centrally warmed by hot water circulation, the two principal rooms by panels in the plaster, all the other rooms in the house, the entrance hall, conservatory, &c., by radiators of various types.

CENTRAL HEATING BOILERS.

Heat is supplied to this system alternatively from an "Ideal" cast-iron boiler in the basement, which can be heated either by coke or by oil. The oil plant is not yet installed.

Side by side with this, and in parallel with it, is a large Potterton gas boiler. The gas boilers have a separate meter. The central heating can thus be supplied either by solid fuel, oil, or gas.

This apparatus is sufficient in itself for all warming purposes, without the use of coal or gas fires, but is normally worked at low power in order to air the house to about 50° Fahr., the balance of the heat being made up by coal or gas fires. There is thus a degree of uniformity in the conditions, which counterbalances the inevitable variations in outside conditions, and which renders possible more or less uniform comparisons between gas, coal, and electric fires.

COAL, GAS, AND ELECTRIC FIRES.

In each of the living rooms, and some of the bedrooms, there is a "Cinderella" gas fire, made by Messrs. R. & A. Main, Ltd. They approach nearer to my ideal of what a gas fire ought to be than any other that I have seen. They have a radiant efficiency of about 48 p.ct., with convective effect of about 8 p.ct. The fires are so arranged that they can be readily removed and replaced, either by ordinary coal, or by electrical fires, for which the house is fully wired. All gas fires are separately metered.

HOT WATER SUPPLY.

The hot water supply is somewhat complicated. It consists of a secondary (heater) cylinder of 100 gallons capacity, fixed in the chamber in the kitchen above the boilers, and connected by circulating pipes to an upper storage tank of 50 gallons, in the neighbourhood of the main bathroom. The latter tank is designed to be heated when desired by an electric immersion heater, which, on account of the present high cost of electricity, has not yet been inserted.

This system is heated, in ordinary circumstances, during the winter, by a branch from the main heating circulation from one or other of the boilers in the basement. This is for the ordinary use of the household in the winter, when the general heat is on, as it always is throughout the winter.

In the summer the main heating boiler is out of action, and the same hot water supply system is heated alternatively by one of two boilers arranged in the kitchen. There is a small "Ideal Classic" boiler, which heats the secondary supply, arranged to be fed alternatively with coke or oil. Side by side with this is a small Potterton gas boiler, adapted for heating the hot water supply directly by gas, and not through the secondary heater.

Thus the hot water supply can be provided: (1) From the main circulation, heated by gas, solid fuel, or oil; (2) from the special summer hot water supply boiler, either by coke or oil; (3) by gas boiler; or (4) by electrical heaters.

The experiments have been made with all these methods except the electrical one, which is obviously at present too expensive, except in the event of the price of current falling below 0·3d. per unit, in which case the electrical heaters will be installed.

The hot water supply pipes and tanks are coated with the best non-conducting composition obtainable—namely, a combination of asbestos and cork—and is of such effectiveness that at any time, day or night, four hot baths, or more, can be taken in succession, even when the boiler fire is out.

COOKING PLANT.

The kitchen premises are equipped, with the most economical modern gas range, and also with the most economical electric stove that I know of, each of which I have tested in the laboratory in comparison with other types. The former is a gas cooker made by Radiation Ltd., with their well-known "Regulo" device, which is the most economical and most convenient type of gas cooker with which I have ever experimented. This is piped with separate meters for the oven and hotplate.

The stand on which the gas oven is placed is in the scullery. It is equally available for an electric cooker, the power being carried to the side of the oven, also on two separate meters, one serving the hotplate and the other the oven.

The electric range, of which several have been tried, is fixed in a recess in the main kitchen. It is of the same size as the gas range. Side by side with this is a gas fire for the use of the occupants of the kitchen in cold weather. Over it is the electric hotplate, which consists of three boiling burners and a griller on a wrought-iron stand.

There is also, in a steel casing at the side, the hot water supply boiler for summer service described above, side by side with a Potterton gas boiler, for the supply of hot water to the house. It is the comparison between these two which is given in the tables.

There is a refrigerator of the "Electrolux" type fixed in the pantry, capable of being used either with gas or electricity. This is separately metered. This refrigerator is in continuous use, except in very cold weather. Its use is then intermittent, as required for the production of ice.

There is also one electrically heated polished copper hotplate in the dining room, and a gas heated one exactly similar, and sundry isolated gas and electric apparatus scattered about the house.

It will be seen that this complicated and expensive outfit is a very complete one for the purpose of making experimental comparisons.

With the plant above described separate comparisons were made between different methods (1) of warming the house, (2) of supplying hot water, (3) of cooking, and (4) of operating the refrigerator.

The general method of test was to run the four sections of the plant with different sets of appliances for different periods,

TABLE I.—*Particulars of Quality and Assumed Standard Price of Fuel Used and Gross Cost of Heat.*

Fuel.	Calorific Value.	Assumed Standard Price.		Gross Cost of Heat.				
		Rate.	Amount of Fuel for 1d.	For 1d.	For 1s.	For £1.	Percentage of Gross Cost of Heat.	
Coal	14,200 B.Th.U. / Lb.	40s. per ton	4·67 lbs.	66,300	792,000	15,800,000	15	100
Coke	12,200 B.Th.U. / Lb.	40s. per ton	4·67 lbs.	57,000	684,000	13,680,000	17·5	116
Gas	500 B.Th.U. per c.ft.	{ 4s. 2d. per 1000 / 10d. per therm }	20 c.ft.	10,000	120,000	2,400,000	100	663
Electricity	3,410 B.T.U. per unit	1d. per unit	1 unit	3,410	40,900	818,000	294	1940

one week or one month at a time, taking continuous readings of the consumption, either of coal, coke, gas, or electrical power, as the case might be, and analyzing the resulting figures. The house was inhabited throughout the tests by the same people, and the same domestic staff were in charge of the apparatus throughout the whole period of the tests, which extended over several years, who had no bias, but were only anxious to get the best results in each case.

Instructions were given that the apparatus was to be used with the same regard to economy as is customary in the establishment, but without any special effort to be parsimonious, and without any undue waste or unnecessary expenditure of fuel. The sole object was to test impartially the relative economy of the various equipments when used in the ordinary way in a household such as this.

I myself made no effort to superintend or supervise the operations, but only to take readings, and to ask for explanations of any undue consumption or irregularity that might appear in the figures and to make the calculations of relative cost. The conditions were, therefore, as uniform as they could possibly be. It is certain that the given figures represent what the actual cost to the householder would have been if only one set of apparatus had existed.

It is obvious that it would be misleading to give the relative costs, according to the actual prices for coke, gas, and electricity which happened to be prevailing in the district at the time. I give them accordingly from assumed standard prices which can readily be altered in proportion to suit any given actual case.

All the price figures given are hereafter calculated on an assumed cost basis given in Table I. Coal or coke 40s. per ton, gas 10d. per therm, electrical power 1d. per unit. In cases where prices vary from this, proportionate alterations must be made accordingly. I have also in certain cases given the cost of an electrical unit and of coal which would make the cost of electrical power and coal the same as gas at 10d. per therm.

SECTION III.—METHODS OF HOUSE HEATING.

The house was normally warmed by the central apparatus in cold weather to about 50°. The apparatus was so arranged with thermostats that this could be readily done. The general heat in the house was sufficient for ordinary comfort, except when people were sitting at rest, in which case a fire was desirable in the interest of comfort and cheerfulness.

The living rooms, in which most of the heating experiments were made, are as detailed in Table II.

TABLE II.—*Heat Requirements of House for 30° to 60°, with Two Air Changes.*

Particulars of House.				Total Heat Loss B.Th.U., 30° to 60°.		
Name of Room.	Cubic Contents.	Heat Loss from Exposure.	Heat Loss from Ventilation.	Per Hour.	Per Day of 24 Hours.	Per Week of 7 Days (168 Hours).
Morning room .	2,156	5346	2330	7,676	184,000	1,285,000
Drawing room .	4,576	9400	4940	14,340	345,000	2,380,000
Dining room .	4,048	5130	4360	9,490	228,000	1,590,000
Boudoir . . .	852	2388	920	3,308	798,000	556,000
Entrance hall .	2,948	5495	3150	8,675	209,000	1,460,000
7 Bedrooms . .	15,622	..	..	46,775	1,120,000	7,900,000
	30,202			90,264	2,160,000	15,200,000

Residents, 4; maids, 2; occasional visitors, 1–2.

HEATING TESTS OF WHOLE HOUSE.

Prolonged series of tests were first made with the house unoccupied, by operating the central heating apparatus alone and unaided by fires, the house being heated up to 60° Fahr. in freezing weather. (*a*) By the coke fired boiler. (*b*) By the Potterton gas boiler by the side of it. This comparison was made in two ways:

(1) When the house was empty, the apparatus being carefully operated in each case to the same degree, and the inside and outside temperatures being continuously recorded. The observations were limited to a fortnight. When the coke fired boiler was in use the fuel was weighed into the boiler, and with the gas boiler in use readings were taken of the meter every few hours.

(2) Similar observations were afterwards continued with the house occupied, but leaving the apparatus controlled by thermostats in charge of a maid and gardener, as in ordinary use, without making special efforts to secure uniformity. These observations were made with the gas boiler in use for five weeks, then the coke boiler being used for the same period, and so on alternately.

In most cases, though heat was kept on during the whole of the day time in all the sitting rooms, hall, and passages, the heat in the bedrooms was turned on in the early morning, shut off at breakfast time, and was turned on at dinner time in the evening, and shut off during the night.

(3) After these tests were completed they were compared with the cost of heating the whole building to the same degree, by means of coal fires, gas fires, and also with electric radiators. This, however, could not be done completely because the bedrooms, entrance hall, and passages, which are all fitted with radiators, are not all fitted with gas fires, as these would normally be useless in this house. The entrance hall is fitted with a special electric dummy brazier made out of an old copper installed in the house when purchased. Sufficient particulars, however, were obtained by careful tests of the existing coal and gas fires and by calculating what *would have been* the increased coal and gas consumption if the entire house had been heated by coal and gas fires only. The same thing was also done for the electric fires.

TABLE III —*Fuel Consumption and Cost of Heating Whole House to 60° when Unoccupied in Cold Weather (30° to 35° Fahr.) for 7 Days of 24 Hours each.*

Kind of Heating.	Total Fuel Used.	Heat Supplied in Fuel.	Rate.	Cost per Week in Shillings.	Percentage Cost.	
Calculated heat required, 15,200,000 B.Th.U. from 30°–60° in 24 × 7 = 168 hours per week.						
Coke fired boiler.	1,722 lbs.*	21,000,000	40s. ton	31s.	16·6	100
Gas fired boiler .	27,090 c.ft.*	13,500,000	10d. therm	113s.	61	365
Coal fires . . .	4,743 lbs.†	66,000,000	40s. ton	84s. 6d.	45·5	272
Gas fires . . .	44,695 c.ft.†	22,350,000	10d. therm	186s.	100	600
Electric heating .	4,450 units‡	15,200,000	1d. unit	370s.	198	1188

Figures marked * represent measured results.
† partly measured and partly calculated.
‡ calculated from experiments.

The figures are given in Table III. which give a fairly accurate statement of the actual cost of heating this entire building in five different ways for a whole week, day and night, in cold weather, up to a temperature of 60° with 30° outside, from which it will be seen that the consumption of coke fuel in the boiler in freezing weather was 1722 lbs., costing 31s. When heating by the gas boiler, the corresponding consumption was 27,090 c.ft., costing 113s., or about four times as much as the coke.

(To be continued.)

Visitors Inspect Halifax Works.—A large party of members of the Halifax and Keighley branches of the Holiday Fellowship, with a few visitors from the movement in Bradford, paid a visit of inspection to the Halifax Corporation Gas-Works on Saturday afternoon, Feb. 22. They were welcomed by Mr. W. B. McLusky, Gas Engineer and General Manager at Halifax, and President of the Manchester District Institution of Gas Engineers, and conducted over the plant in parties by Mr. McLusky and several of the staff. As consumers, the visitors were particularly impressed by the fires, cookers, and general sales facilities of the undertaking and the system of retailing carefully selected coke in 3d. bags through the medium of some 50 local shops.

Mr. F. J. West Speaks on Salesmanship at the British Industries Fair.

Responding to the toast of the "Gas Industry" at a luncheon yesterday at the British Industries Fair, on the occasion of a visit of the Gas Salesmen's Circles and the Midland Junior Gas Association, Alderman F. J. WEST, C.B.E., J.P., M.Inst.C.E., M.I.Mech.E., said: I feel greatly honoured in having been asked to respond to the toast of the gas industry on this important occasion, but am fully conscious of the practical impossibility of doing full justice in the time at my disposal to the whole wide range of its technical, administrative, and economic features. The immensity of our industry is expressed by a few leading statistics. The capital invested in the gas industry is estimated at over 160 million pounds, the number of workmen directly employed by the gas undertakings is between 110,000 and 115,000, the annual wages bill is in the neighbourhood of 17 million pounds, and it is estimated that 90 p.ct. of the population of this country uses gas in some form or other.

The progressiveness of the industry is surely emphasized in the excellent Gas Section of this British Industries Fair, where we have an impressive demonstration of how an industry has modernized its methods to meet changing conditions; and I should like to add my tribute of praise to those responsible for this organized effort, and to congratulate them on a pronounced success.

Directing one's attention particularly to salesmen met together to pool their ideas with regard to the development and organization of the market for gaseous fuel, one would like to endeavour to put forward some helpful suggestions.

Yours is a dual problem. You have to remove ignorance and to sell a commodity which is capable of immense service to your customers. The sort of ignorance you have to contend with is that impression which has undoubtedly got abroad that gas is being in some way superseded, that the gas industry is, to some extent, marking time, that other means of distributing light, heat, and power are more in accordance with modern ideas, and that gas has not made any particular progress in recent years. Anyone in touch with the facts is aware that these ideas are, in the main, the result of ignorance.

A steady annual increase in the sale of gas is the unvarying experience of the gas industry. Corroboration of this statement is readily obtained by a study of the Technical and Public Press, and particularly by a perusal of recent issues of the industry's journals, in which the annual meetings of most of the gas undertakings are reported. These reports provide striking evidence of progress. The increases in 1929 in the case of the two main London Undertakings, the Gas Light and Coke Company and the South Metropolitan Gas Company, were 4½ p.ct. and 5·3 p.ct. respectively. Other increases which may be mentioned are those of Croydon, 6½ p.ct.; Cambridge, 6·3 p.ct.; South Suburban, 6·5 p.ct.; Derby, 5½ p.ct.; and Southampton, 6·7 p.ct.

MR. HAYDAY'S ADDRESS.

The address given by Mr. Arthur Hayday, M.P., Vice-President of the National Union of General and Municipal Workers, at the Annual Conference of the British Commercial Gas Association in Eastbourne in October last, showed in a most convincing manner what gas has done for the workers in their homes, representing largely that section of the community who use the 4½ million slot meters which have been introduced since about 1895. This address has been issued in pamphlet form, and already some 300,000 copies have been distributed. I would urge a much wider publicity for this excellent portrayal of "The Importance of the Gas Industry to Labour in General and to the Workers' Home in Particular."

Now let me refer briefly to the all-important question of salesmanship. Scientific salesmanship is as much an integral part of the operations of a gas undertaking as are the adoption and use of modern carbonizing methods for the production of cheap gas; and it is encouraging to find concentrated attention to this side of the industry by the administrators of gas undertakings. The British Commercial Gas Association during eighteen years has consistently and successfully emphasized the importance of efficient salesmanship, and its Chairman, Mr. F. W. Goodenough, has delivered on several occasions some most instructive and inspiring addresses on this subject, and to a much wider field than that of the gas industry.

GAS SALESMANSHIP IN THE UNITED STATES.

It has been my privilege to make a tour round the world, and a visit to South Africa, within the last twenty months, in connection with the business activities of my firm; and while everywhere one found general unanimity that British manufactured goods are still the best in the world, there is a consensus of opinion that in our selling and merchandizing we are not in the front rank. In these respects it is very generally accepted that we by no means do justice to the quality of the goods we have to sell. A study of the gas industry in the United States suggests that there is little doubt that on the technical and manufacturing side, as regards plant, equipment, and gas appliances, we occupy the foremost position, but that our selling or merchandizing ability has not reached the American standard. This opinion is shared, for example, by Mr. L. R. Grant, General Manager of the Primitiva Gas Company, Buenos Aires, who has recently made a business tour of the United States and England to investigate the present practice of gas undertakings in regard to salesmanship and commercial development. In a written communication I have received from Mr. Grant, confirming a conversation I had with him some few weeks ago, he says: "American Gas Companies contend that development in the gas industry is entirely governed by a judicious selection of commercial men capable of developing a 'selling force.'" He further says: "I cannot lay too much stress on the excellent way in which the U.S.A. gas undertakings plan their selling campaigns. A close study is made of existing competition, and a series of probable objections is carefully analyzed with a view to finding suitable arguments in favour of gas. Salesmen in the U.S.A. are divided into two categories. The first one deals with ordinary or well-known uses of gas, the second category deals entirely with new uses and new industries. Co-operation between the two categories has been established in no uncertain manner, and it is safe to say that every possibility afforded for the use of gas is most carefully exploited." Mr. Grant expresses his sincere admiration for English practice, and finds that the gas business here is a great and growing one.

The particular point one would emphasize, arising out of American salesmanship in the gas industry, is that in the home of electricity the consumption of gas *per capita* is higher in several of their large cities than in several of the large cities in this country. This fact in itself is a tribute to efficient salesmanship.

What we want in this country, where there is a growing intensity of politically aided competition, is intensive and intelligent salesmanship directed to a campaign of public education as to the fact that gas is the fuel of the future as it is of the present.

QUALIFICATIONS OF A GOOD SALESMAN.

This brings me to a summary of the qualifications necessary in the salesman. He must have a thorough knowledge of the technical properties of the commodity he is called upon to sell, and of the proper and best use of the appliances he is offering. He must have enthusiasm, initiative, and a profound knowledge of human nature. Without the latter he cannot expect to create an "atmosphere" sympathetic to his cause. But there is yet another thing which is necessary to the successful salesman; he must have the support of the industry. He must know that the undertaking he serves is ready to supply gas to every prospective consumer within the district covered, and he must be supported and aided by modern showrooms and efficient advertising and publicity campaigns. And, lastly, with this necessary range of qualifications to render successful service to the community, the salesman must receive adequate remuneration for his services. If the gas industry is to continue to hold its own in competition and to secure its normal development it will have to realize more than it has done in the past that efficient and successful salesmanship demands high qualifications, and that the remuneration for the necessary service will have to be on a more generous basis if the right type of men are to be attracted to the industry.

Time will not permit of any more than a passing reference to the widely extended use of gas for industrial purposes, or to the low present-day cost of gas, but attention should be drawn to the fact that the cost of gas has not increased during the last fifteen years in anything like the same proportion as that of the coal from which it is prepared.

In conclusion, I am optimistic as to the future of our industry, believing that by rendering honest and intelligent service to the community we are sure of success. I hope that this gathering and this exhibition will generate a spirit of enthusiasm and co-operation which will contribute its proper share to that success.

New Stock Issue at Leatherhead.—The Leatherhead Gas and Lighting Company invite applications for a new issue of debenture stock. The stock is the balance of the Company's loan capital, and is being issued at par. It is redeemable, also at par, at the option of the Company between the years 1945 and 1955. Interest will accrue at the rate of 5½ p.ct. per annum from the date of purchase and will be payable half-yearly. The amount of stock available for subscription is about £19,000, and purchasers may take any amount from £5 upwards. Application should be made to the Secretary of the Company, North Street, Leatherhead.

Gas Bills for 1930.

(*Concluded from p. 317.*)

SOUTH STAFFORDSHIRE MOND GAS COMPANY.

By their Act of 1901, the South Staffordshire Mond Gas Company were empowered to manufacture and supply Mond producer gas within an area in the counties of Stafford and Worcester; but it was not to be used for purposes of illumination, and the Company were not to supply it for use in private dwelling-houses. The statutory conditions regulating the supply of gas by the Company differ materially from those applying to undertakings supplying gas for use in (among other places) private dwelling-houses and for the purpose (among others) of illumination; and the Company are believed to be the only one supplying gas under statutory powers solely for industrial purposes. They therefore ask to be exempted from the provisions of the Gas Regulation Act, 1920, and the Gas Undertakings Act, 1929.

[*Parliamentary Agents: Messrs. Sherwood & Co.*]

SOUTH YORKSHIRE AND DERBYSHIRE GAS COMPANY.

This is an extensive Bill, which has for its main object to provide for the amalgamation of the undertakings of the Dinnington and District Gas Company, Ltd., the Staveley Gas Light and Coke Company, Ltd., the Whitwell and District Gas Company, the Bawtry and District Gas Company, the Beighton and District Gas Company, Ltd., and the Maltby and Bramley Gas Company, Ltd. The South Yorkshire and Derbyshire Gas Company is to be incorporated, to take over the amalgamated concerns; and that Company are to have power, subject to the approval of the Board of Trade, to purchase the gas undertakings (so far as situate within the limits of supply) of the Shireoaks Colliery Company, Ltd., the Tickhill Gas Light, Coal, and Coke Company, Ltd., the Gringley and District Gas and Coal Company, and the Thorne Gas Light and Coke Company, Ltd. The amalgamation of the first six Companies is to date from Jan. 1, 1931.

The capital of the new Company is to be £176,967, of which £165,305 is to be the original capital, and be substituted for the existing share capital of the six Companies, and £11,662 is to be additional capital, which may be raised as provided in the Bill. The original capital is to be allocated as follows:

Dinnington Company—For each original ordinary share, £2 5s. of stock; for each additional ordinary share, £1 11s. 6d. of stock.

Staveley Company—For each original ordinary share, £1 6s. 8d. of stock; for each additional ordinary share, 18s. 8d. of stock.

Whitwell Company—For each original ordinary share, £1 of stock; for each new ordinary share, 14s. of stock.

Bawtry Company—For each original ordinary share, £1 13s. 4d. of stock; for each additional ordinary share, £1 3s. 4d. of stock; for each preference share, £1 of stock.

Beighton Company—For each ordinary share, £1 3s. 4d. of stock; for each cumulative preference share, £1 3s. 4d. of stock.

Maltby Company—For each ordinary share, 16s. 8d. of stock; for each cumulative preference share, £1 3s. 4d. of stock.

Power is taken to borrow, in respect of the original capital, the sum of £82,652, and up to one-half of any additional capital raised.

A calorific value of 475 B.Th.U. is specified; and the basic prices of gas are to be in the Dinnington area 12d. per therm, and in the Whitwell area 15d. per therm. The price in the latter area must not exceed by more than 3d. the charge in the Dinnington area. The basic prices are subject to revision at any time after five years. The basic rate of dividend is 6 p.ct. on the ordinary stock; and the dividend on any preference stock issued is not to exceed 7 p.ct. For a prepayment meter and fittings, the charge may be not more than 2d. per therm.

Authority is sought to establish profit-sharing schemes, and to enter into agreements with other undertakers, as well as to make loans to other companies.

[*Parliamentary Agents: Messrs. Lewin, Gregory, Torr, Durnford, & Co.*]

SOUTHPORT.

In a General Purposes Bill of the Southport Corporation, there is a section dealing with gas matters. The clause to enable the Corporation to purchase, sell, let for hire, &c., gas apparatus, has added to it the words "and stoves and fittings for coke or smokeless fuel, and may provide all materials and do all work necessary or proper in that behalf, and with respect thereto may demand and take such remuneration or rents and charges, and make such terms and conditions, as may be agreed upon." Further powers are taken to enter premises in order to inspect meters, fittings, and works for the supply of gas, and for the purpose of ascertaining the quantity of gas consumed. The power to enter premises to remove pipes, meters, and fittings is extended so as to include all cases in which any person entering into occupation of any premises previously supplied with gas by the Corporation shall not require to take such supply or to hire fittings, &c., belonging to the Corporation. There is a clause giving authority to compel repairs in case of danger, and another having reference to the laying of pipes for ancillary gas purposes.

USE OF GAS GEYSERS.

The following clause has relation to the use of gas geysers:

> No gas geyser or other similar hot-water apparatus heated by gas shall be used in any premises unless it is supplied with a proper ventilating pipe or shaft open to the external air for the adequate dispersal of fumes or unconsumed gas so as to avoid danger or injury to health.
>
> The surveyor or sanitary inspector or other officer authorized in that behalf may at all reasonable times enter any premises where he has reason to believe that any such geyser or hot-water apparatus is retained, fitted, or used in order to inspect the same; and if he be satisfied that such geyser or hot-water apparatus does not comply with the provisions of this section, he may order the occupier of the premises to disconnect the same or cause the same to be disconnected from the gas supply. And if such disconnection be not effected within twenty-four hours, then the surveyor or sanitary inspector may disconnect or cause the same to be disconnected.
>
> Any person offending against the provisions of this section shall be liable to a penalty not exceeding £5.

[*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

STOKE-ON-TRENT EXTENSION.

This is a Bill to extend the boundaries of the City and of the Parish of Stoke-on-Trent so as to include the Borough of Newcastle-under-Lyme, the Urban District of Wolstanton United, the Parish of Clayton, and part of the Parish of Keele. The gas limits are to be extended so as to include these areas.

The gas undertaking of the Stoke-on-Trent Corporation and those of the Newcastle Corporation and the Wolstanton Council will be carried on as separate concerns, provided that at any time the Stoke Corporation deem it expedient in the interests of economic management or of the improvement of the supply of gas that the several undertakings should be combined, they may so determine. There is a clause governing the maximum prices of gas.

[*Parliamentary Agents: Messrs. Lewin, Gregory, Torr, Durnford, & Co.*]

WEST BROMWICH.

This Bill is for the purpose of extending the boundary of West Bromwich, so as to include a certain portion of the Borough of Wednesbury, part of the Borough of Walsall, and some of the Parish of Great Barr. This will involve an extension of the limits of the West Bromwich Corporation for the supply of gas so as to include the added parts of Walsall and of Great Barr, which areas will cease to be within the limits for the supply of gas of the Walsall Corporation. There are provisions for the purchase by the Corporation of the mains in these added areas.

[*Parliamentary Agents: Messrs. R. W. Cooper & Sons.*]

Provisional Orders.

GLASGOW.

A Provisional Order promoted by the Glasgow Corporation contains the following clause authorizing the purchase by them of coke oven or other gas.

> The Corporation and any person may enter into and carry into effect contracts and agreements for the supply by such person to the Corporation of gas produced in coke ovens and by any other means for all or any of the purposes of the Glasgow Gas Acts, 1910 to 1927.
>
> For the purposes of this section, the Corporation may lay down, erect, place, repair, alter, renew, and remove mains, pipes, and other works and conveniences either within or beyond the limits of the Corporation for the supply of gas, subject to the provisions of the Gas-Works Clauses Act, 1847, with respect to the breaking up of streets for the purpose of laying pipes and for the protection of such pipes when laid.

[*Parliamentary Agents: Messrs. Martin & Co.*]

KIRKCALDY.

A Provisional Order drafted by the Kirkcaldy Corporation contains a clause extending the resolution passed by the Corporation in 1909 adopting the Burghs Gas Supply (Scotland)

Act, 1876, so as to include also the Burgh of Dysart. There is a clause which states:

> The Corporation shall from time to time fix the price to be paid for gas to be supplied during any succeeding year or half-year, and until such price be altered by the Corporation the price so fixed shall remain in force: Provided also that the prices charged shall be the same to all consumers under like circumstances, and the revenue of the gas undertaking shall be credited with an amount for the gas consumed for public lighting calculated at such reasonable rate not being less than the cost of production of gas as the Corporation may determine.

Moneys received may be applied in several ways, which include "in aid of the consolidated rate," as to which there is the following stipulation:

> Provided that the amount which may be applied in aid of the said rate in any year shall not exceed 1½ p.ct. of the outstanding debt of the undertaking. And, further, that no sum shall be paid in aid of the said rate unless the depreciation and renewals fund amounts to more than one-twentieth of the aggregate capital expenditure of the undertaking. Any deficiency of income in any year may be charged upon and paid out of the rate.

[*Parliamentary Agents: Messrs. Robertson & Co.*]

British Commercial Gas Association.

Meeting of the General Committee.

A Meeting of the General Committee of the "B.C.G.A." was held at the British Industries Fair, Castle Bromwich, Birmingham, on Wednesday, Feb. 19—the PRESIDENT, Mr. Henry Woodall, M.Inst.C.E., in the chair.

On the motion of the Chairman of the Executive (Mr. F. W. Goodenough, C.B.E.), seconded by the President, it was resolved that a letter be addressed to Lady Weaver expressing the Committee's sincere regret in the loss which she and the Association had sustained in the death of her husband, Sir Lawrence Weaver.

Both the President and Mr. Goodenough referred, in feeling terms, to the high esteem in which Sir Lawrence was held by the gas industry.

NEW YEAR HONOURS.

It was resolved that letters be addressed to Sir William E. Whyte, a Vice-President of the Association, and to Mr. Will Thorne, C.B.E., conveying the congratulations of the Committee on the honours which His Majesty the King had conferred upon them.

ELECTION OF NEW MEMBERS OF THE COMMITTEE.

Recommendations from the districts concerned for the election of the following as members of the General Committee were unanimously approved:

Mr. A. P. Allan (Scarborough),	representing	Northern District
Mr. J. Corrigan (Penrith),	"	"
Mr. R. W. Cowie (Hawick),	"	Scotland
Mr. D. Fulton (Helensburgh),	"	"
Mr. H. G. Ritchie (Falkirk),	"	"
Mr. A. C. Young (Arbroath),	"	"

EXECUTIVE COMMITTEE.

Recommendations from Scotland and the Northern District for the re-election of Mr. J. W. McLusky and Mr. T. P. Ridley as members of the Executive were unanimously approved.

A report, as follows, from the Executive was approved:

INCREASED SUBSCRIPTION.

While, during the past year, the additional income placed at the disposal of the Association through the increased subscription of 1s. 6d. was substantial and encouraging, a special effort is now being made to add to the number of members contributing on the 7s. 6d. basis. This is largely a matter of personal and individual canvass, especially as regards the larger members, but it is hoped that by this means the funds available for national publicity will be substantially increased. The growing intensity of politically-aided competition makes the campaign of public education as to the facts of gas as the fuel of the future all the more urgent and imperative. This is the keynote of the Association's appeal to members for increased financial support.

ANNUAL CONFERENCE, HULL.

The Nineteenth Annual General Meeting and Conference will be held on Oct. 27-29, inclusive. While the members of the Association will be the guests of the British Gas Light Company, Ltd., at Hull, the scarcity of suitable hotels in that city renders it necessary for alternative arrangements to be made for the residential accommodation of members attending the conference.

Preliminary investigation of the position has been made in consultation with Mr. Harold E. Copp, the Engineer and Manager of the Hull Works; and with the approval of the President it is proposed that the residential quarters and some part of the conference proceedings shall be arranged at Bridlington. It is proposed that special trains be arranged for the necessary travelling between Hull and Bridlington, and *vice versa;* and members may rest assured that the whole programme will be so arranged as to ensure their comfort to the fullest possible extent.

A further report will be presented to the Committee at their next meeting in May.

DISTRICT MEETINGS AND CONFERENCES.

Special meetings of representatives have been held in Scotland and the Northern Districts, and a number of further meetings have been arranged, and will be held in the near future. These meetings provide opportunities for laying before the districts policy on various aspects of the Association work, and enable Headquarters to ascertain and keep in touch with the feelings of members throughout the country.

The first of this season's District Conferences was held at Huddersfield, just prior to Christmas, when a very successful meeting resulted. Practically every important gas undertaking in the West Riding was represented. The Medical Officers of Health for Huddersfield and Leeds took prominent part in the afternoon session, and a large public gathering in the Town Hall in the evening was addressed by Dr. Saleeby. A feature of the public meeting was the lively and profitable discussion that followed the lecture. The amount of local and district publicity resulting from the conference was remarkable.

EDUCATIONAL FILMS.

Proposals for the production of educational gas films and for their distribution to, and display at, educational centres, women's social clubs, and similar institutions have been considered by the Executive Committee. The Committee have authorized the production of a film dealing more particularly with the domestic uses of gas; and, if this proves successful, they propose to extend the scheme to other phases of gas service.

The Executive have also had before them proposals for the display of these films by means of portable projectors in connection with showroom cookery demonstrations and lectures; and details of this scheme will be circulated to members in due course.

There has been a gratifying response by members to the request of the Association for detailed information on the question of lighting. At the time this report was prepared, over 200 forms had been returned, and, in the majority of cases, very fully answered. Without anticipating the conclusions to be drawn from an examination of the whole of the forms likely to be returned, it can be said at this stage that the information now available points to the necessity, in a number of cases, of improved service to the consumer if the lighting business is to be retained.

GAS HEATING.

The Executive have had under consideration several points in regard to gas heating—viz.:

(*a*) The use of gas fires in the treatment of patients suffering from bronchitis, &c.
(*b*) Policy with regard to the use of flueless heaters.
(*c*) Gas "Economy" flues.
(*d*) The proper selection and fixing of gas fires.

These matters call for careful inquiry, and the Executive propose to invite the Joint Committee representing the Institution of Gas Engineers and the Association, which was set up to deal with the last-mentioned item, to include items (*a*), (*b*), and (*c*) in their deliberations.

The report of this Joint Committee will form the basis of a useful discussion at a future meeting of the General Committee.

The Seventh Annual Meeting of the members of the Salesmen's Circles will be held in London on Friday, April 11. The Association has been fortunate in securing the promise of Mr. Frank W. Moore, of the Spirella Company of Great Britain, Ltd., to give an address at the morning meeting, which will be held in the Caxton Hall, Westminster, and after luncheon a visit to the Ideal Home Exhibition at Olympia will conclude the day's programme.

F. W. GOODENOUGH, Chairman.

PRESS PUBLICITY CAMPAIGN, 1930-31.

Recommendations with regard to the proposed Press Publicity Campaign for 1930-31 were considered and approved.

Conveyors and Elevators for Use in Gas-Works.

By C. S. THANE, of Newport.

[From a Paper before the Wales and Monmouthshire Junior Gas Association, Jan. 11.]

CONVEYORS OF THE SCRAPER OR PUSH PLATE TYPE.

These are especially useful where material has to be delivered at several points. They are made either horizontal or inclined, and are largely employed for filling coal bunkers and stores, also the hoppers of mechanical stokers. In the scraper type conveyor of heavy pattern, with rollers and with a cased elevator feeding it, the push plates or drag plates are attached to an endless chain drawn along in a steel trough. The plates are usually bolted or riveted at every fifth link in the chain, or at other points as desired, a special link being attached for this purpose. The chain is a very important part of this type of conveyor, for it must be strong enough to withstand the heavy friction of dragging along the coal, coke, ash, or other material for which it is designed. I know of no chain better suited for such work than "Leys'" bushed type, which is so easily repaired and maintained in good condition. As stated, attached to the chain are the push plates which are of mild steel and easily renewed—a very important consideration, for their action of skidding along causes some wear. In large conveyors, rollers are fixed on either side of the push plates to minimize friction. The trough is usually built up of steel angles and plates, all wearing-parts (the chief of which are the skidder-bars attached at either side of the trough) being easily renewable.

SLAT CONVEYORS.

A slat conveyor is built up of steel or wood slats which are secured to an endless chain or chains (I say "chains" because it is usual to have two lines of chain with the slat secured across the two); they are suitably driven and tensioned, with roller plates and steel framing. This type of conveyor can be used for carrying coal, coke, ash, sulphate of ammonia, &c.

BAND OR BELT CONVEYORS.

These can be used as an alternative to either scraper or tray conveyors. The only serious drawback is the expense of frequent renewal of belts. Their installation cost, which may be worth considering, is cheaper than that of a chain conveyor.

SPIRAL, WORM, OR SCREW CONVEYORS.

Though these conveyors are not frequently seen in the gas industry, they are worth mentioning. They will handle small coal, oxide, or sulphate of ammonia. I believe they are very successfully employed for use in the drying of sulphate of ammonia. They are not considered suitable for long drives, owing chiefly to the difficulty of alignment, and the power required to drive them is considerable.

ELEVATORS.

Elevators of the usual type for raising small coal, ash, oxide, sulphate of ammonia, &c., have malleable iron or pressed steel buckets fixed at intervals on a single strand of chain running on top and bottom wheels. The chain is supported at intervals either by flanged rollers or by runners fixed to the buckets and sliding on angle iron guides. The lifting capacity of an elevator varies with the size and pitch of the buckets and, of course, with the speed of the elevator, which should not be greater than 200 ft. per minute. A good speed is 150 ft. per minute. Still again, the rate of feeding is of importance, for if this should be irregular, some buckets will be carried full, some half full, and some empty. In view of this, the buckets are usually made larger than the capacity the elevator really requires, to obviate the flooding of the vessels and spilling of the material. The smaller or finer the material to be handled, the more compact will it form in the buckets. Generally speaking, therefore, if an elevator be required of 50 tons per hour capacity, it is well to bear in mind the above facts, and have the elevator made to accommodate (say) 60-70 tons per hour.

The most important detail of an elevator is the chain, and an interesting point about conveyors is the method of attaching the various forms of carriers, such as buckets, trays, slats, and scrapers, to the chain. Conveyor chains, therefore, merit our first consideration. A malleable cast-iron chain very much used for light elevators and conveyors is the Ewart chain. The great merit of this chain is its wonderful simplicity, for it has no joint pins or connections, and can be very speedily made up to any length or detached, as desired, by sliding one link sideways from the other. For convenience and reference a special title has been given to all chain links, which are standardized. Thus we have the K1 link, which is a bucket attachment, and may also be used for the bolting or riveting of wood or steel slats to the chain. A very popular type of chain in general use is the No. 600 "Leys'" chain, which has a steel pin some ⅝ in. diameter, and has a breaking strength of 30,000 lbs. It is undoubtedly one of the most successful forms of conveyor or elevator chains employed. It has a hardened steel bush, which is renewable and easily fitted merely by sliding in. Two bars are cast in the link to prevent it turning. In my opinion, this chain, if attended to occasionally by renewing pins and bushes, will give indefinite wear.

A special type of chain, used largely in gas-works for conveying hot coke, is the De Brouwer chain, which is very effective in saving labour. This chain is made in conveyor form by having two chains secured together by a riveted steel scraper plate. With hot coke conveyors the wear on the link bosses is very heavy and causes the chain to become elongated, or "out of pitch." If allowed to work in such a condition this would cause the failure of the drive by the chain slipping over the sprocket. To obviate the difficulty, however, the sprocket teeth are adjustable and renewable.

For severe duty, the wear on cast-iron wheels becomes excessive, and it has been found a great improvement to have the wheels "chilled." For wheels working in gritty situations, a good hard wheel is essential. Cast steel and manganese steel wheels are used, the trouble with these being the difficulty of machining. This is overcome by casting in a mild steel or wrought-iron bush, which can be bored and keywayed. Sometimes sprocket wheels are made in halves, which are bolted and machined as a whole wheel. The advantage of a split wheel is the facility with which it can be fitted and removed without disturbing the shaft. The buckets or cups in an elevator are usually made in one piece, either of pressed steel, or of malleable iron. Alternatively, they are built up of steel-plates riveted together. The wear and tear on the lip of a bucket in a dredging elevator is very considerable, and to improve the durability, it is usual to have an extra thickness (cast with the bucket) on the lip. In the case of the built-up bucket, suitable beading iron, or flat, is riveted at the lip and carried around the edge. The back of the bucket where the chain is bolted on should not be too thin, lest the bolt-holes become elongated, and the bucket distorted, or perhaps torn clean away from the fastenings. For very heavy work a patch plate on the back is essential to increase the stiffness and the supporting area of the bolts.

SOME PRECAUTIONS.

It will be well to add a few precautions to be observed in the prevention of breakdowns to conveyors and elevators:

(1) All wearing strips on the skidder bar type are secured to the angle framing by counter-sunk bolts, the whole in time becoming very thin owing to wear, the counter-sunk bolt head wearing off, which leaves the thin steel strip loose and liable to spring up. The skidder bar in this case will get below the strip, and will not go far before it meets with an obstruction. This results in the tearing of the skidder bar, and fracture of the chain. Therefore, you will see the necessity for keeping the wearing strips in good condition, and for renewing them whenever necessary.

(2) Special attention must be given to the chain, for, like all material in service, it gets fatigued. Fatigue is a physical change in the structure of metal brought about generally by vibration and by alternating stresses in opposite directions. This results in the parting of the chain link. This may not occur all the way through the link, but will be apparent on one side, the conveyor or elevator working quite well, until, unable to stand the strain, the chain parts. The periodical examination of the chain while running light will quickly disclose any fractures; a very good plan is for the attendant to examine the chain daily before starting on load by placing a chalk mark on one link and carefully watching the chain from a good point of vantage the whole way round.

(3) The daily inspection may be extended here, for the split cotter pins, and link pins, need attention. The constant dredging action of an elevator chain causes considerable wear and deterioration on the split pins; the corrosive action of wet ashes and coal dust eat them away, leaving the link pin free to work out. This is very rare, for chain pins which have been in use for some time have a slight step worn into them, which has the effect of locking them into position. Link pins very rarely break, but I have known one or two breakdowns due to the pin having parted in the centre. In this case it is very difficult to detect, for it is not until the chain link end begins to open, or one portion of the pin works out, that it is apparent. As stated, a careful scrutiny at regular periods may mean a great saving in time and labour, not forgetting the cost and the necessary renewals such a breakdown would necessitate.

Discussion.

Mr. W. H. JOHNS (Swansea) spoke of the systems employed when

he was a young man in the industry, and compared these with the modern methods now in operation.

Mr. W. CLARK JACKSON (Neath) said that the paper was one of very great interest, as conveyors and elevators were in use in some form or another in practically every gas-works, apart from those of extremely small output. Mr. Thane had rightly drawn attention to the important small details in connection with these plants, and which, if not given careful attention prior to installation, were likely to affect adversely the life and running of the plants. The satisfactory lubrication of installations of this description was not a difficult matter, but, unfortunately, in a number of cases, the importance of efficient lubrication was not given sufficient attention. He had found that a useful adjunct to the ordinary Stauffers lubricator in use on conveyors was to have an oil tank fitted immediately over the driving sprocket wheels, and a small pipe led from this to feed oil to the chain link joints and to the back of the flange of the guide rollers. This oil could be either a cheap brand, or oil returned from any of the other more important machinery after use there. The same thing applied to the elevator, particularly where skidder bars were used to guide the elevator buckets and keep them in position. This method would considerably lengthen the life of the skidder bars and wearing strips, in addition to enabling the elevator to be run more efficiently. With regard to power drive for conveyors and elevators, Mr. Jackson said he was a strong adherent of electric motor drives, as automatic overload switches and fuses could be interposed, which would ensure entire freedom from actual damage or breakage to any part of the conveyor or elevator due to overloading or failure of any mechanical part. In the case of the coal crusher where it was usual to have a fairly heavy flywheel to overcome the work of actual coal breaking without damage to the motor drive, he had found wooden pegs the best means of preventing damage when a foreign substance was inadvertently charged into the breaker.

Regarding elevators, he agreed with Mr. Thane in voting for the totally encased elevator with front cover plates for accessibility; for freedom from coal dust was thereby ensured. As to driving sprocket wheels, in some types of conveyor it was a better job to have two links to which the scraper plates were attached, and for these to run over solid wheels with three or more flats thereon, these flats being suitable to accommodate the chain link. These gave a very steady running, and were not liable to deterioration from wear and tear to the same extent as were ordinary sprocket wheels. Continuing, Mr. Jackson said he agreed with Mr. Thane when he suggested that fairly large diameter sprocket wheels were the best in conjunction with a good type of reducing gear. It was often found that the mechanical side of gas-works did not get the attention it should. In his own works, a system was in operation whereby an inspection was made every Saturday as to the condition of the plant, and a report was sent in. Should any of the plant need repairs or adjustment, the mechanical staff were given this as the first job on Monday morning. This arrangement had been in operation for many years, and had meant complete freedom from any serious breakdown.

Mr. J. W. HEARSON (Pontardawe) asked the author whether graphite on a wiper was advantageous to the life of a chain.

Mr. J. H. CANNING, Jnr. (Newport), made reference to safety devices, which sometimes did not work when required. He asked for some details of the tray or pan conveyor, and also as to the feed methods to elevators. With regard to the sliding doors, he had found that these tended to stick.

Mr. J. A. CUNNIFFE (Swansea) said he would like to ask the author whether he thought it advisable to lubricate skidder bars or let them run dry.

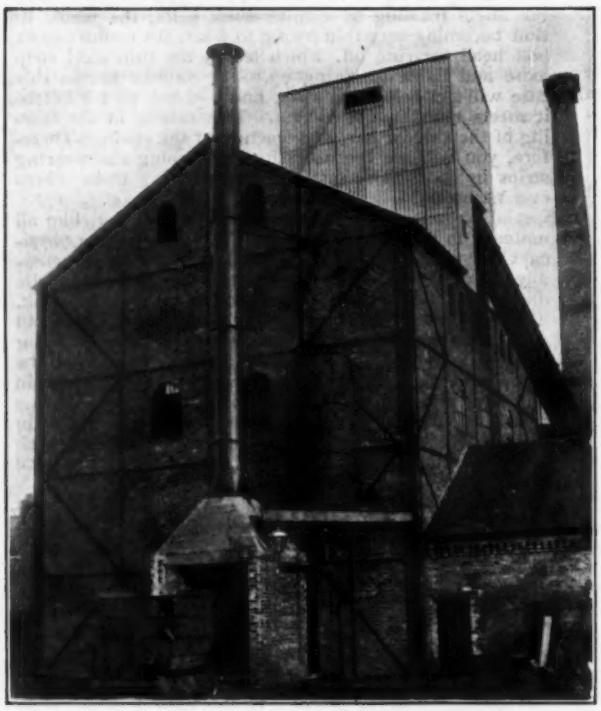
Mr. THANE thanked Mr. Johns and Mr. Jackson for their kind references. Replying to Mr. Hearson, the author stated that a graphite wiper was an excellent means of lubrication. With regard to the safety devices mentioned, Mr. Thane thought that, if these were kept in order, very little or no trouble would be experienced in their working. He went on to give details of a tray conveyor, and explained the various means of feed to elevators, making reference to the tension arrangement. In reply to Mr. Cunniffe, it was stated that the lubricating of the skidder bars on coal elevators was unnecessary, for in coal the element of graphite was a means of lubrication; there were cases, however, of elevators working on various commodites where it was necessary.

Mr. C. H. COLLINS proposed, and Mr. A. D. HOWELLS seconded, a vote of thanks to Mr. Thane for his paper.

Vertical Chamber Ovens at Oswestry.

The Directors of the Oswestry Gas Company possess an up-to-date installation of intermittent vertical chambers which were put to work in October last and have given entire satisfaction.

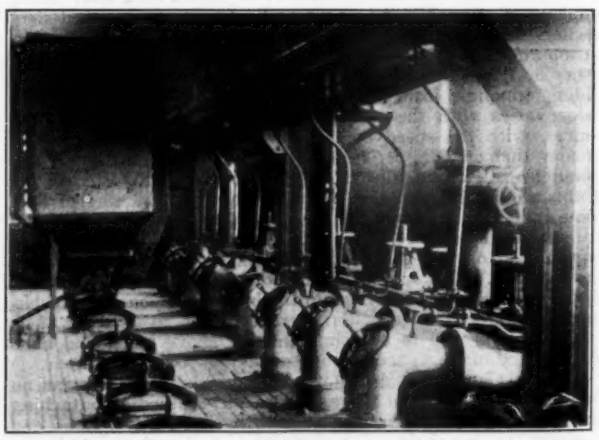
The old plant consisted of nine beds of seven horizontal stop-end retorts, hand charged, and an idea of the immediate success of the new installation can be gained from the fact that the old horizontal plant was shut down completely within 12 hours of charging coal to the first chamber.



General View of Installation.

There is no doubt that this plant is well worthy of inspection; it is the first of its kind to be erected in Great Britain, though many installations of similar type are working satisfactorily on the Continent. The whole of the material used in the plant is of British construction, having been manufactured and erected by Gibbons Bros., Ltd., of Dudley.

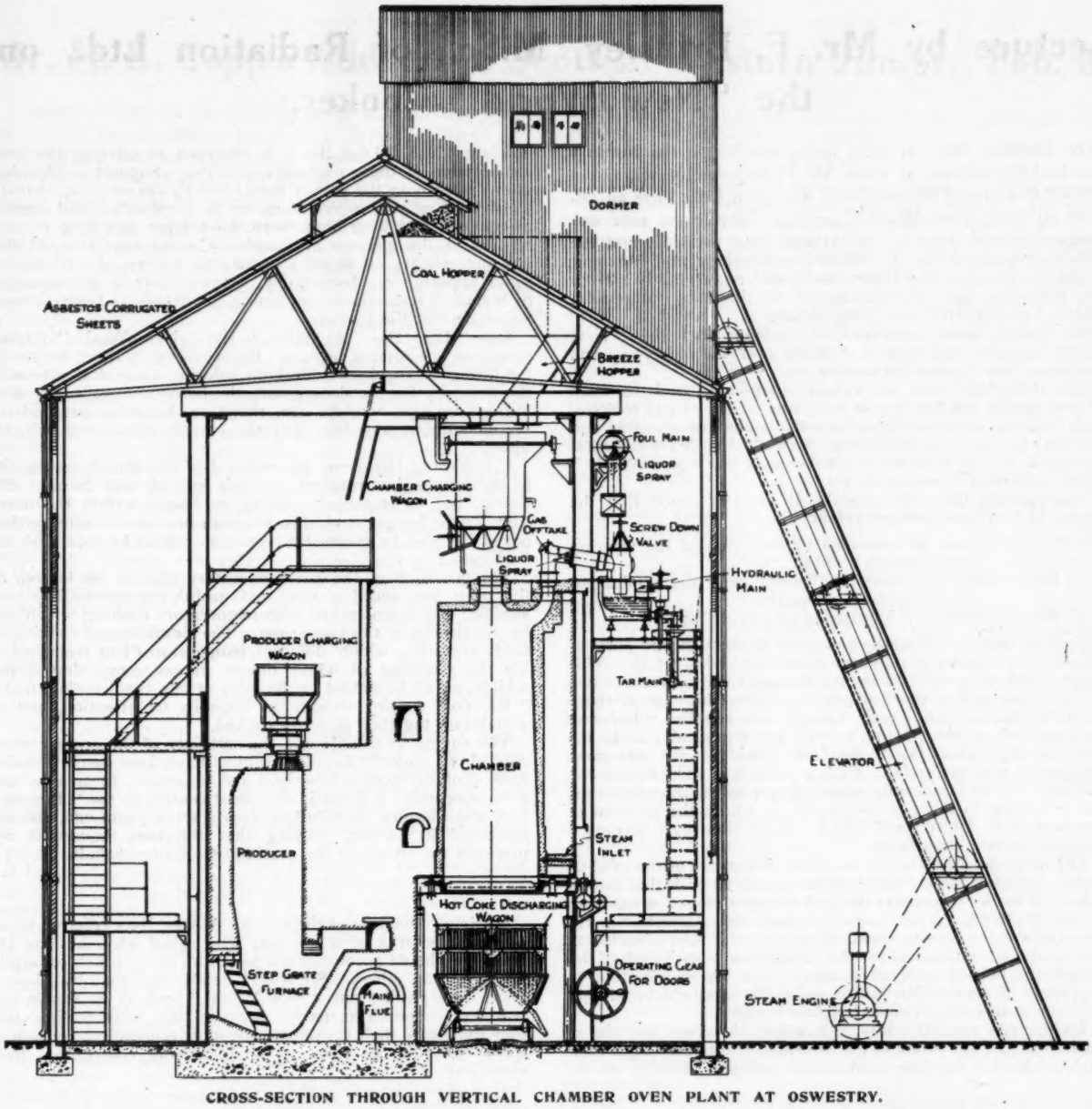
The installation consists of ten chambers each of a capacity of 32 cwt., charged every 12 hours and arranged in three units —viz., two settings of four and one setting of two chambers. The flexibility of this arrangement is worth noting, and, further, by simple damper adjustments the heats can be reduced and duration of carbonizing period increased to 16 or 18 hours for minimum output. The chambers are rectangular in cross-section with rounded corners, and have a uniform taper both in width and breadth for the full height of 17 ft. 9 in., the average cross-section being about 5 ft. 2 in. by 11½ in.



View on Top of Chambers.

The chambers and heating flues are constructed of 95 p.ct. silica blocks having tongued and grooved joints, the sides of the chambers being built with panel bricks of a design to give strength combined with maximum heat transmission from the flues to the inside of the chamber. The front and top of the settings are insulated, reducing the heat losses to a minimum and giving good working conditions for the operator. Each setting is provided with its own producer, which is of the step-grate type and is fed by means of a travelling wagon running over the top.

Coal and breeze are raised by means of a cased-in elevator to



CROSS-SECTION THROUGH VERTICAL CHAMBER OVEN PLANT AT OSWESTRY.

the overhead storage bunker, which has separate compartments of a capacity of 40 and 5 tons respectively. A hand-propelled charging car running on an overhead track receives coal and breeze from the main bunker; this car is fitted with adjusting plates so that the weight of charge can be varied to suit requirements. The chambers are charged from the top through a cast-iron door fitted with a self-sealing lid, the bottom of the chamber being closed by means of a water-sealed cast-steel door. This door is operated by a simple system of gearing worked by a handwheel at ground floor level.

View from Hydraulic Main Platform.

Each chamber is provided with its own gas offtake pipe, which is fitted with a liquor spray for cooling the gas and preventing the formation of pitch. A separate hydraulic main is provided for each bed, fitted with the usual cleaning doors, liquor overflows, tar outlets, &c. The gas leaves the hydraulic main by means of a vertical offtake pipe which is also fitted with a liquor spray.

The coke is discharged from the chambers into a travelling hot coke car propelled by an endless chain to the quenching tower, which is built immediately outside the retort house and extends above the roof of house to carry away the fumes during quenching. After quenching, the coke car is taken into the yard, where it is automatically discharged.

The plant is easily operated by two men per shift, and the power costs are very low, machinery having been reduced to a minimum; the only power unit employed is a 7½-H.P. steam engine which raises the coal and breeze to the overhead bunker and also drives the haulage gear for the coke car.

The demand in the Oswestry District is for gas of a high calorific value; consequently the chambers are not steamed, but provision has been made in the chambers so that they can be fitted with steaming equipment at some future date. The installation is housed in a steel-framed structure filled in with brickwork panels, the roof being covered with asbestos sheeting. The house is built entirely separate from the carbonizing plant, staircases and platforms being provided for giving access to all parts of the plant.

Lecture by Mr. F. Brinsley, M.Sc., of Radiation Ltd., on the "New World" Cooker.

On Tuesday, Feb. 11, there was a meeting at the Nottingham Gas Showrooms, at which Mr. F. Brinsley, M.Sc., of the Central Research Laboratories of Radiation Ltd., gave an address on the "New World" cooker. There were over one hundred persons present. Sir ALBERT BALL presided, and the gathering included Mr. J. Wilkinson, Engineer and Manager of the Nottingham Gas Department, and representatives from the following gas undertakings: Nottingham, Mansfield, Ripley, Langley Mill, and Long Eaton.

Sir ALBERT BALL expressed the opinion that the "New World" cooker was a great advance over the old types, and was one of the best on the market.

Mr. BRINSLEY said: Important improvements have been effected during the last few years in the design of gas cookers. Both hotplate and oven have been the subject of scientific and technical research, from which have resulted such fundamental changes that only in external outline does the "New World" cooker resemble its predecessors.

Dealing first with the hotplate, it may be stated that the objects in view have been threefold:

(1) Simplification accompanied by reduction of the wearing parts to the minimum number.
(2) Improvement in thermal efficiency, and the attainment of a higher standard of combustion.
(3) The provision of a hotplate of greater utility.

Simplification.—The various sizes of cookers in any particular series now differ in only one dimension—viz., width. This has enabled the number of boiling burners to be reduced to two only—a long and a short shank—except in the case of those hotplates with which duplex burners are supplied. Hotplate bars are now either "units" or of two types only, as in the case of the "Disc Bar" hotplate. Bridges are the same throughout any one series. Such a process of reduction in the number of parts is not only advantageous to the manufacturer, but is a boon to the gas companies, to whom the problem of stocking parts for renewal has for some time past become a matter of prime importance.

The Thermal Efficiency of the hotplate burners of the modern cooker has been largely increased as compared with that attainable with earlier types, and the problem of combustion has been resolutely faced. This latter problem has necessitated the elaboration of a special chemical test for the determination of traces of carbon monoxide—the dangerous constituent of incompletely burned gaseous products—and the application of standards of combustion which should be attained by all gas appliances, including cooker hotplate burners.

Utility.—As regards utility, it has been the consistent aim of Radiation Ltd. to combine the desirable features of high thermal efficiency, complete combustion, and pan stability on the hotplate. The "Disc Bar" is regarded as offering the best combination of these necessary qualities. Support is provided immediately over the burner head for even the smallest utensil; pans can readily be moved about on the hotplate without danger of tipping; and both high thermal efficiency and proper combustion of the gas are attainable. Correct regulation of the gas and primary air supplies to hotplate burners is a matter of some importance. Accordingly, every cooker is accompanied by a card of instructions containing full details as to the correct adjustment of the burners.

The "Disc Bar" hotplate of the "New World" cooker possesses one unique feature. By provision in the "Vertico" tap-fitting of regulators for both calorific value and pressure, the necessity for air sleeves with the burners disappears. The burners on this hotplate can, therefore, be taken out and replaced without any fear that the correct adjustment will be upset.

Considering the oven, the removal of the flue from the top to the bottom has resulted not only in increased thermal efficiency, but in improved cooking conditions within the oven. The single burner and direct-bottom-flue outlet construction paved the way to automatic oven-heat control by means of the "Regulo."

The provision of the low-temperature zone at the bottom of the oven has added a new and useful feature without any sacrifice of the amount of high-temperature cooking which can be carried out at the same time. The simultaneous cooking of foods requiring widely different temperatures has made possible the planning of whole dinner menus comprising dishes which can all be placed in the oven at one time, cooked under "Regulo" control without the necessity for attention, and all withdrawn together perfectly cooked.

The saving in trouble and the certainty of the process when carried out under "Regulo" control have done much to transform cooking from a laborious and uncertain, to an easy and sure, operation. Automatic oven-heat control by the "Regulo" has, since its first introduction nearly seven years ago, steadily increased in favour, proving that the busy housewife appreciates the efforts of the gas industry on her behalf.

Replying to a vote of thanks, Sir ALBERT BALL referred to the previous remarks of a speaker, who asked why the Gas Department should encourage the use of a cooker which consumed less gas than others. Sir Albert emphasized that his Department were putting out "New World" cookers on simple hire and on hire-purchase terms, because they fully realized that they must give their consumers the most economical appliances, more especially in view of the increasing competition from electricity.

Cornish Association of Gas Managers and the Coal Mines Bill.

A deputation representative of the above waited upon the Cornish Members of Parliament at Truro on Saturday last to impress upon them the necessity for the rejection of Part 1 of the Coal Mines Bill now before Parliament, and which proposed to place a further burden upon industry in general and the gas industry in particular.

The President (Mr. H. H. Hoare, Falmouth) headed the deputation, and Mr. J. H. Ellis (Plymouth) and Mr. S. J. Ingram (Truro) put the case for the Cornish gas industry.

While the members gave the deputation a sympathetic hearing, no pledge was given that they would vote against the Bill.

Mr. Walter Runciman, M.P. (St. Ives Division), mentioned that the Bill had achieved something, and this was the bringing together of the coal-owners and the miners, with peace in the industry.

Sir Donald Maclean, M.P. (N. Cornwall), remarked that no one could say what the additional cost of coal would be, or what the burden would entail. The coal-owners had indicated 1s. 5d. per ton; but this was purely an estimate. Many amendments to the Bill had been tabled, and were likely to be accepted, and which would have the effect of modifying the provisions.

At the Annual Meeting of the Association held at Truro last Wednesday, Mr. H. H. Hoare (Falmouth) was re-elected President, and Mr. F. G. Kingwell Hon. Secretary, for the ensuing year.

The President, in acknowledging his re-election, said that the Association had the smallest membership of any of its kind in the country, but it was a live Association, thanks to the efforts of the Hon. Secretary.

Tenders for Aldershot Stock Issue.—The tenders for the £100,000 5 p.ct. perpetual debenture stock which were offered on behalf of the Directors of the above Company were opened on Feb. 19, the issue being considerably over-subscribed at prices ranging from £98 down to the minimum of £93 per £100.

Society of British Gas Industries.—The annual general meeting of the Society will be held at the Hotel Metropole, Northumberland Avenue, London, on Friday, May 16, under the Presidency of the Right Hon. Viscount Cecil of Chelwood. The annual dinner will take place in the evening. The programme will be announced later.

A New "B.R.T.A." Publication.—An interesting little booklet has recently been published by the British Road Tar Association on the subject of roadmaking, and the benefits to be obtained by the use of tar on road surfaces. The subjects dealt with are of direct interest to the gas industry as well as to the motorist, ratepayer, and surveyor. The motorist requires a non-skid, resilient, dustless surface; the ratepayer something substantial, economical, and durable; the surveyor a combination of all these things. The booklet goes on to summarize some notes on the character, scope, and possibilities of British road tar, setting out some of its particular qualities. There is finally a note on the work of the British Road Tar Association during nearly three years of useful existence, pointing out what they are doing in the national interest in the furtherance of the use of British tar on our roads.

Mr. H. E. Copp's Address to Scottish Western Juniors, Feb. 8.

I esteem it as a very special compliment that you have asked me to come here to address you to-day. When my friend Mr. McLusky first mentioned to me some months ago that I might be invited to do so, I said that I should regard it as a peculiar honour that I might be permitted to address a Junior Association in Scotland. It is not without some trepidation, however, that I venture to do so, as by common repute your system of education is much more effective than that which exists on the south side of the border—I often wish that this arbitrary and largely topographical line was non-existent. It is certain that you lay very secure foundations in your elementary educational system, and that your avenues to higher education and to the universities are broader than ours are at present. It is not merely a matter of reputation; from personal knowledge I can say that a large proportion of our most desirable appointments are held by your fellow countrymen, and even when we are suffering from physical disabilities we generally have to rely upon them to cure us. Pride of race is an admirable attribute of man, but may be cultivated to excess; and I think that the day has come when we should be more careful to seek out and recognize the merits not only of our fellow Britishers, but of those of other nations than our own. By all means, however, let the interests of our own fellows come first. Certain it is that the gas industry is indigenous to this Island, and that we, as a nation, have been responsible for its early nurture, and in a large measure for its subsequent growth. It is still our duty to see to it that the wellbeing of the industry is maintained, whether we hail from the North or from the South of the border.

Competition.

The gas industry has arrived at a somewhat critical period of its existence. Never has any industry had to face such difficulties; a great deal of artificial prejudice seems to have been created against it. I am confident, however, that, with high ideals and tenacity of purpose on the part of every one of us, the difficulties will be surmounted and that right and justice will, in the end, prevail.

First, we have electrical competition which is often unfair and based upon methods which I hope the gas industry will continue to avoid as it has in the past. Then we have the considered policy of each successive Government, which promises an electrical Elysium in the hope of securing votes. The day will surely come when the public realizes the true state of affairs, and the gas industry will again receive fair play. We have one consolation, however, in the knowledge that, whatever the fortunes or misfortunes of other industries may be in these days of excessive taxation, the investing public retains its confidence in the gas industry.

Any comments which I may express in this address are my own. I have no authority to speak for the Institution of Gas Engineers, or to comment on the policy of my colleagues who are members of the Council of the Institution.

As most of you know, I am the Chief Official of a moderately sized undertaking in the east of England, which is controlled by a very progressive Board of Directors; and I will content myself by saying that this undertaking serves its consumers in a very efficient manner, pays the full statutory interest on its capital, and obtains a revenue on the sale of gas at a fraction under 6¾d. per therm sold.

Value of Research.

The results of the recent research by the Institution of Gas Engineers will be found fully set out in the various reports which have been published from time to time. I have heard the criticism advanced that the results of the researches have not been commensurate with the great amount of work involved. I do not, however, agree with this view, as I think that a large area of ground has been covered, and cleared for more constructive work in the future. At any rate, it may be claimed that definite and beneficial results have been attained by the Research Sub-Committee on Gas-Works Effluents, and that several undertakings are reaping the benefit of the work done by this Committee.

Whether the results of research are sufficiently evident or not, it is only by research that progress can be made; and progress is essential to every industry, particularly the gas industry, to enable it to meet intensive competition. The old adage that "what was good enough for our fathers is good enough for us" is a dangerous and poisonous fallacy, for, by a natural process of evolution the progress of one generation becomes the necessity of the next generation. Our own industry furnishes an example in that, had it not been for the introduction of gas for lighting, the development of our engineering, textile, and many other industries would have been impossible; and I think it may be said that gas is to-day a prime necessity in some 3000 trades in the country.

Education.

I am deeply interested in this subject, having been actually engaged on my own for a great number of years. The word education is much misunderstood. Some people regard it as a large or small amount of study or reading which is got through by a boy between the ages of (say) eight and sixteen. Personally, I would define education as the process by which we acquire sufficient knowledge to enable us to develop our powers of observation and deduction. Observation is the soul of education. If the gas engineer finished his education before the age of twenty, he would soon realize that it had not really started. It is much like the elementary rules of your excellent national game—"Keep your eye on the ball, and follow through." Speaking of what I would call the foundation of education, I consider that much benefit is to be obtained even by only a superficial study of the classics (ancient and modern), as this gives one a greater interest in one's native language, and saves many references to the dictionary. I would also set a high value upon some knowledge of one modern language—particularly French, as a knowledge of French helps to broaden one's outlook on life; and if, better still, a colloquial knowledge of this language is acquired, it has a distinct commercial value. I realize, however, that many would disagree with these views.

On the completion of the period of elementary education, it is necessary that the prospective gas engineer should pursue his studies in either a technical school or, better still, a modern university; but I have always strongly held the opinion that where possible the university course should be combined with a practical course, for gas engineers can eventually graduate only in the school of experience. This is the philosophy of the old as well as the young. There is a danger that a university education divorced from practical work may merely act as a mental narcotic, and render the student incapable of appraising the relative merits of practice and theory.

Status of the Gas Engineer.

From time to time statements are made by those engaged on the technical side of the gas industry that they are lacking in status as compared with other branches of industry. There is, alas, much justification for this complaint. One has only to read the technical journals to see the miserable rate of remuneration offered to candidates for important positions, who are expected to devote the whole of their time to their job, and also be expert technicians. I have serious doubts as to whether the salaries offered in the gas industry are sufficient to attract the right type of men. Education costs money; and if employers are not prepared to pay sufficient remuneration to cover the capital outlay of such education, the supply of men will not be forthcoming. People eventually get little more than they pay for.

Here I would like to say one word against the practice of many local authorities, and of a few companies, of advertising for a technical man, setting out the qualifications they require and ending up by saying "state salary." It strikes me as being a particularly mean effort to obtain services of a higher value than they are prepared to pay for. On the other hand, there is still difficulty in obtaining qualified men who are prepared to undertake responsibility, and it must be remembered that he who is not prepared to do this only possesses a relatively low market value. The question has often been asked, "How can we raise the status? If the aphorism that "knowledge is power" is true, I seriously suggest that the first step to take is to persuade corporations and companies, by means of our attainments, that we are just as fine fellows as we think we are. I suggest that the time has come when we need a new definition for "engineer," for at present we have to qualify it by stating what kind of engineers we are. The man who comes to put a washer on our hot water tap is designated an engineer, just as is the man who builds gigantic irrigation works, bridges, or docks. The Institution of Gas Engineers has rendered a great service to the industry, and to every member of it, by formulating its Education Scheme, for, in a few years' time, if a man calls himself a gas engineer there will be no mistake about it.

This Education Scheme was rendered necessary by the granting of the Royal Charter, and, as most of you are aware, it had to be modified in some respects to conform to the ideas of the premier Institution, the Institution of Civil Engineers. Personally, I think that they were well within their rights in insisting on these alterations.

Progress of Education in Our Industry.

To show the progress of education in the gas industry, in 1924 there were only 37 internal candidates and 19 external candidates, or a total of 56; whereas last year there were 239 internal candidates and 108 external candidates, or a total of

347; while in minor courses last year there were 930 students, as compared with 567 in the previous year.

Mr. Walter Hole, the late Education Secretary, has admirably summed up the progress of education in an article appearing in the "GAS JOURNAL" for July 24 last. Greater facilities for education, however, are available every year, though it is a melancholy fact that, out of well over twenty university colleges in Great Britain, there are only six places of university rank where fuel technology is regarded as a full subject in the university curriculum. Owing to the efforts of the Institution Education Committee, there are few places in Great Britain where a student cannot pursue his studies for want of facilities. In some cases it may mean going quite a long distance, but anything that is worth having is surely worth fetching. In former days there was some excuse for students in that they had greater difficulty in obtaining access to suitable books and literature; but there are now a large number of cheap and reliable text-books available, and I am sure that our Technical Journals cater to the full for those desirous of obtaining information. Indeed, I think we are suffering from a spate of technical journalism, as it takes almost as long a time to make our selection of what to read as it does to acquire the knowledge we are seeking.

I can imagine a young man saying, Why all this talk about education? "I am getting a little tired of attending all these classes. I am only engaged in one minute branch of the industry; my work is rather monotonous, and I do not see much chance of advancement." To such a young man I would say, no matter what your particular job is, see that you do it better than anyone else can do it; and when this is recognized, as it almost certainly will be, you will find that you will have other jobs in due course The industry never wanted specialists more than it does to-day, and, if the young man to whom I am referring is fortunate enough to be engaged in the carbonizing department of any works, he will have ample opportunities for exerting all his energies. I still believe that the profits of the industry are made in the retort house. The retort houses are the mainsprings of our gas-works; and I am quite sure that, taken as a whole, our carbonization leaves much to be desired. The retort house is perhaps the least attractive of any department on a gas-works, and, therefore, the tendency may be to leave it as much alone as possible; but I do emphasize the necessity of exercising the closest control of every detail of the retort house, and not leaving anything to chance.

The process of carbonization is going through a period of slow but certain evolution, and in many works it has become almost an exact science. The use of the large proportion of our national fuel resources is a great responsibility, and the most economical fuel is increasingly dependent upon a highly trained personnel. The work done at the Leeds University in connection with the Research Committee of the Institution of Gas Engineers in relation to reactivity of cokes will prove very useful, and much can be done by the blending of various coals in the direction of producing cokes suitable for industrial and domestic uses. The purification of coal at the collieries, as outlined by Dr. Lessing, should prove to be of great benefit to the gas industry.

EVE OF GREAT DEVELOPMENTS.

I will not be so rash as to indulge in prophecy, but I have an impression that we are on the eve of other great developments in connection with the gas industry. I refer to the removal of sulphur compounds from gas by hot catalytic processes; the catalytic treatment of tar vapours; the mechanical purification of gas in closed vessels by oxide of iron, instead of the large purifiers at present in use; the extraction of benzole from gas by means of activated carbon; the direct production of sulphate of ammonia by the Tern electro-thermo process. I put next the hydrogenation of coal and coal-tar products by the Bergius process. This process has been taken a step further in Germany, where it has been found possible to produce hydrogen by electrolysis under the very high pressures necessary for this process. Where cheap electric current is available, however, great possibilities may be opened up which might conceivably alter our present practice of dealing with coal and its derivatives. The process is also used for converting a non-coking coal into a coking one.

Work is in progress on:

Tankless gasholders of the Klönne and "M.A.N." types, particularly in regard to the sealing of the piston.

The storage at 50 lbs. pressure; Hortonsphere storage at 100 atmospheres.

The Cox combustor (surface combustion).

The Hammond burner for submerged combustion.

The combustion of gas round a gas mantle, and the intrinsic brilliancy of mantles.

The scorching effect of gas fires

The erosion of mains, internal and external.

The drying of gas.

Gummy deposits in mains and meters.

ELECTRICITY.

To revert to a matter with which we are already familiar, I would urge every student to make himself thoroughly acquainted with electrical standards, and to know precisely the amount of current consumed by the so-called half-watt lamp in the various sizes, which, according to the figures published by the Gas Light and Coke Company, varies from 0·65 watt per candle for a 500-watt lamp to 2·23 watts per candle for a 40-watt lamp. Students should also be fully acquainted with the mysterious methods of charging for electricity now in force. I know of one case where it is advertised that electricity is sold at ½d. per unit for lighting, whereas, when the rateable value of the house is taken into account, the consumer is being charged at no less than 4d. per unit.

I would also like to emphasize the necessity of maintaining the lighting load. For quality of light and cheapness, gas is, in most cases, greatly superior to electric lighting. I mention this matter as in some quarters gas lighting is not receiving fair play, even at the hands of many engaged in the industry. Gas lighting is the most self evident use of gas, and, as the eye is the window of the soul, it is a subject which should receive our most serious attention. Except for purely decorative effects, gas lighting is superlative where pure light, without glare and without extravagance, is desired.

Direct electric light without suitable shading is injurious to the eyesight, and such shading involves much greater expenditure in current. This is a point which our educational and street lighting authorities appear to overlook; it should surely receive due consideration, as it seriously affects the much taxed public purse.

I should like to pay a tribute to the enterprise of the Gas Light and Coke Company in the establishment of educational classes for their younger employees, and to the great work of Mr. F. W. Goodenough in the interests of education. That such work should be left to individual effort is surely a reflection on the elementary educational system provided by the State, which, in my opinion, especially in many of our industrial centres, leaves much to be desired.

My final word is, may every young man engaged in the gas industry cultivate a hobby, and may that hobby be the greater welfare of the gas industry.

Discussion.

The PRESIDENT (Mr. R. D. Keillor), referring to the working results of Mr. Copp's undertaking, observed that the selling price worked out at 6⅜d. per therm. With an industrial load of only 10 p.ct., this was particularly good. The average annual consumption per consumer was 33,000 c.ft., while 60 p.ct. of the consumers were using slot meters. Mr. Keillor appealed for facilities for Juniors to attend week-day meetings.

Mr. J. W. MCLUSKY (Glasgow) explained the difficulties confronting any scheme for juniors of part-time technical training and practical work. With most municipal and education authorities the proposition meant the selection of candidates who would certainly be pointed to as favoured juniors. Electrical competition was keen, and not always fair; and there was great difficulty in arriving at a fair basis of comparison when discussing costs. Powers were being sought to enable gas to be sold on a two-part tariff basis, similar to methods operating successfully in the United States. Gas would certainly in these circumstances have a fairer deal. Too often the standing charges for electricity were overlooked, or merged in rent, when making comparisons; only the low basic charge per unit being taken into account. The Western Juniors, said Mr. McLusky, were fortunate in having had such an inspiring address from one who had in his time been a most alert junior, and had at an early age assumed important responsibilities.

Mr. D. MELVIN (Uddingston) remarked that Mr. Copp had recommended the study of French. He thought perhaps German might be better, in view of the vast amount of research work done in Germany. It had been said that "profits are made in the retort house," but this idea must be coupled with attentive service. He expressed the opinion that all cheap and shoddy appliances should be condemned, and warehouse people prevented from selling such.

Mr. A. TRAN (Helensburgh) said that their greatest fear from electrical competition was in connection with the lighting load, which might be taken as 25 to 30 p.ct. of the output. An efficient scheme of maintenance could do much here.

Mr. W. KIRK (Polmont) referred to the regulation of the Education Scheme which insisted on 1st Class Certificates before a student could proceed to the Diploma of the Institution. He thought this rather hard on the student, and asked if any concession might be granted.

Mr. A. L. MCFARLANE (Glasgow) stated that the Education Scheme, in his opinion, fell short in that one must either be an engineer or a chemist. He thought that provision might be made for practical experience in both. The attitude of the country towards electrical schemes might be judged from the fact that only 8 p.ct. of the recent loan was taken up.

Mr. DAVID FULTON (Helensburgh) stated that he differed with Mr. Copp on the question of Scottish Education. He considered the English primary and secondary education quite equal to the Scottish. He advised Juniors to "read little and well." The best-read man was not always he who had read most. Academic certification must be linked with practical experience. Electrical competition was unfair from the total cost point of view, and few electricity consumers realized actually what they paid. Greater freedom should be allowed gas undertakings in the question of charging, and a two-part tariff would serve a most useful purpose.

Mr. R. STURROCK (Ardrossan) referred to the checking and charting of retort temperatures, which had been in operation in Glasgow, and which he had instituted in Ardrossan with good results. He felt that

there would soon be a complete revolution in the question of purification. With regard to street lighting, he instanced a case of lighting two streets by electricity. The annual cost of 200 lamps was £550, whereas by gas the cost of lighting the entire town was £700; the illumination in the streets in question being equal.

Mr. J. FRAZER (Glasgow) asked how the blending of coal was effected, and what benefits had accrued in the revenue from the improved coke. He referred to the desirability of giving juniors workshop duties for practical experience, and the difficulties encountered in obtaining such facilities. He felt that in a small works the students had better opportunities.

The PRESIDENT made a plea for the rating of all gas appliances on a "B.Th.U. input" basis, in order that a more direct comparison could be drawn with electrical appliances.

Mr. COPP, in reply, thanked the members for the helpful discussion. He felt amply satisfied with his visit to Scotland. The price in Hull was actually 7d. per therm, but with the various discounts the price was reduced a little. He realized the difficulties of "half-time" education. The Educational Institutions did not favour the scheme, which was a big disadvantage. The modern language he advocated was really a mental accomplishment. The selling side of any undertaking must co-operate with the production side. He found it a decided advantage to have women to examine and adjust gas burners; they were tidier and more welcome to the housewife than was the fitter. He outlined briefly the method he had adopted in the blending of coals, and how it led to improvement in the coke. He thought Mr. Keillor's suggestion of rating appliances a very fine one.

A very hearty vote of thanks was accorded Mr. Copp for his address.

Development of Submerged Combustion.

By C. FEATHERSTONE HAMMOND.

[From a Paper before the Institute of Fuel, Feb. 12—Dr. F. A. Freeth, O.B.E., F.R.S., in the Chair.]

(*Continued from p.* 501.)

The head tank is provided with a deflector cover, upon which the aerated column of hot water impinges. This effectually separates the steam and gases from the water, and this steam-gas mixture descends by way of an annular passage (15) surrounding the rising main, finally leaving the system by way of a heat exchange in counterflow with the return cold water from the radiator system entering at (19), the gases finally leaving at the lowest possible temperature by way of the outlet (13). Upon the temperature of the exhaust gases will depend the over-all efficiency of the system; the lower these are, the less heat will be lost to the system by this source.

Under normal conditions, supplying the fuel gas with practically the theoretical proportion of air for perfect combustion, there are exhaust gases containing no oxygen and only a very small proportion of carbon monoxide. These exhaust gases are at a very low temperature for such products, being at only 120° Fahr. when the room temperature is maintained at 64° Fahr. At this low exhaust temperature much of the water vapour formed on combustion is condensed, and its heat added to the system.

The conditions are, then, for the particular town gas, of 501·5 B.Th.U per c.ft. heating value, supplied:

Exhaust gases—	
Nitrogen	3·455 c.ft.
Carbon dioxide	0·482 ,,

measured at 60° Fahr., and 30 in. mercury pressure.

Gross B.Th.U. in the gas	501·5
Net ,, ,, ,, ,,	448·1

The whole of the difference, 53·4 B.Th.U. (*i.e.*, 10·6 p.ct. of the gross value of the gas) is lost as latent heat of the water vapour from combustion on all normal systems under working conditions, with the one exception of the Hammond system. In this, with the exhaust gases at their (to this system) normal temperature of 120° Fahr., saturated with water vapour, the loss per cubic foot of fuel gas by latent heat of water vapour uncondensed is 22·1 B.Th.U. (= 4·4 p.ct. of the gross C.V.). The sensible heat loss is a further 5·0 B.Th.U. (1·0 p.ct.). Thus we have:

Useful heat recovery	474·4 B.Th.U. per c.ft.

This is 94·6 p.ct. of the gross calorific value, and actually 105·8 p.ct. on the net or lower calorific value, on which value results are often calculated.

A town gas of 561·4 B.Th.U. per c.ft. heating value gives, on perfect combustion, per c.ft.:

Nitrogen	3·904 c.ft
Carbon dioxide	0·467 ,,

measured at 60° Fahr. and 30 in. mercury pressure.

Gross B.Th.U. in the gas	561·4
Net ,, ,, ,, ,,	499·3

Difference = 62·1 B.Th.U. = 11·1 p.ct. on the gross C.V.

The efficiency, burning this gas, with the exhaust at 120° Fahr., is 94·5 p.ct. on the gross, or 106·2 p.ct. on the net C.V. With the exhaust at 110° Fahr. the useful heat recovery is 96 p.ct. of the gross, or 108 p.ct. of the net heating value of the gas.

This, then, indicates the advantage in a low exhaust temperature, as well as the necessity of assessing performance on the basis of the true heating value of the fuel. Now, in adopting the net calorific value of a fuel, engineers have regarded the latent heat of the water vapour in the products of combustion as irrecoverable. But the net basis, though often adopted, is not a true one, and its relation to the true—that is, to the gross calorific value—must be kept well in view, for with the advent of the Hammond system the question becomes one of practical politics, as will be shown.

Submerged combustion on the Hammond system, by intimate contact of the products of combustion with the water to be heated, couples rapid and complete heat transfer with an extremely low exhaust temperature. In the central heating unit this exhaust temperature is not higher than the temperature of return water from the radiators. Condensation of the water vapour in the products of combustion, with the recovery of its latent heat, takes place.

It is seen that more than 100 p.ct. of the net heating value of the fuel is recovered at the exhaust temperatures normal to central heating on the Hammond system. That the net value gives a false basis is then manifest. That it is, nevertheless, often employed must be remembered when comparisons are made with other central heating systems.

It will be appreciated that since the head to which the water or any other fluid can be raised depends upon a differential between two columns of the fluid, on the well-known principle of the air lift, the greater the head required the higher will be the pressure head against which fuel and the supply of air must be maintained.

A static head of 10 ft. 6 in. on the hot side of the system meets most requirements in providing the equivalent of a pumped head to circulate the water in a heating installation against the frictional head of pipes and radiators, though this head may be increased to meet the special requirements of any particular building.

To achieve this 10 ft. 6 in. head and to maintain the supply of fuel and air to the burner, a pressure of 5 lbs. per sq. in. on the fuel and air supply mains has been found adequate. The cost of providing power for boosting the town gas supply and providing air, both at a pressure of 5 lbs., is 0·4 B.o.T. electric unit per therm.

This would not be the case if we had to pump the fuel and air against the head of water represented by the height of a centrally heated building of several storeys, and for this reason the installation is made at the top floor of a building instead of in the basement. This feature brings about several advantages, one of which is especially patent in buildings such as offices and warehouses, where ground floor space is of so much more value than the top floor or roof. The absence of a flue or chimney will be appreciated, in addition to which we have the saving of all bunkering accommodation and the complete absence of the dust and dirt of stoking, and there are no ashes to dispose of.

A standard duplex unit of 2 million B.Th.U. per hour nominal rating arranged to provide the equivalent of 10 ft. 6 in. pumped head, occupies a floor area of 38 sq. ft. at the operating or grid floor level, and 23 sq. ft. for a depth of 7 ft. 6 in. below the operating level.

A comprehensive range of pipe column lengths and fittings has been standardized, and widely different specifications may be met by varying the number and rating of the combustion units without the employment of special fittings. The standard single unit is made in nine sizes from 60,000 to 1,000,000 B.Th.U. per hour. The multiple unit is standardized in sizes from 120,000 to 4,000,000 B.Th.U. per hour, covering duplex, triplex, and quadruplex assembly.

The Hammond circulator unit above described is completely automatic, and in the standard arrangement is started and may be stopped by remote push-button control. During normal working periods the circulator may be automatically controlled by the temperature of the building. The system is

automatically shut down by means of a hydraulic servo circuit operating upon the failure of power at the booster or failure of the air, fuel, or water supply. With the aid of submerged combustion it is now possible to concentrate or otherwise heat-treat highly corrosive liquors in completely corrosion resisting all-stoneware apparatus. Submerged combustion eliminates the hitherto insuperable difficulty of heating liquids effectively in stoneware containers. This is accomplished in the Hammond system by evolving the heat directly in the liquid itself.

A three-unit battery of Hammond concentrators occupies 22·6 sq. ft. of floor space, each main vessel being of 7·1 gallons capacity. The process is continuous, acids or other corrosives of any strength being handled without depreciation of the plant or contamination of the product. All contact surfaces are impervious to attack, so that depreciation and wear and tear of plant is practically negligible.

The capacity of this plant run continuously per 120-hour week is, for example, (*a*) 5 tons of finished phosphoric acid of 110° Tw. concentrated from 40° Tw., (*b*) 3½ tons of finished sulphuric acid of 160° Tw. concentrated from 60° Tw., or (*c*) 16½ tons of finished sulphuric acid of 144° Tw. concentrated from 120° Tw.

The over-all thermal efficiency is above 90 p.ct., calculated upon the net calorific value of the fuel.

Operation of Dalton's Laws.

When applying submerged combustion to liquids to raise them to their boiling point, some peculiar results are obtained by reason of the operation of Dalton's laws. According to Dalton's laws of pressure of mixed gases and vapours:

(1) In any mixtures of gases and vapours, each constituent exerts its own pressure independently, and the extent of this pressure is the same as the vapour would exert if present in an otherwise vacuous space. This law does not apply to mixtures in which the constituents act chemically upon each other.

(2) The number of molecules of a given vapour which can be contained in a given space is the same whether the space contains the vapour alone or other gases or vapours in addition.

The important conclusion to be drawn from these laws is that the total pressure exerted by a mixture of gases is the sum of the individual pressures, and this fact has a very direct bearing upon the submerged combustion. The gases from the flame, after having aerated the zone of liquid surrounding the flame, and their heat content having thereby been imparted to the water or other liquid substance, so that no temperature difference exists between the gases and the liquid, rise to the surface and escape with such vapour as corresponds to the temperature of the gases at the moment of leaving the liquid.

The pressure of this gas is the absolute pressure of the system *minus* the vapour tension of the vapour with which it is saturated; and if the mixture is escaping at atmospheric pressure the pressure of each component will be that corresponding to the proportion which such component bears to the whole. In a mixture of 50 p.ct. steam and 50 p.ct. combustion gases, for instance, the temperature will correspond to half atmospheric pressure, since the atmospheric pressure on the system is the sum of the pressures on the two components, and the temperature of the steam-gas mixture at atmospheric pressure, 14·7 lbs., will be that of steam at 7·35 lbs. absolute, or approximately 179° Fahr., and not 212° Fahr.

It is found, therefore, that in the application of the submerged flame to evaporation of chemical solutions and other evaporation problems, the operation of Dalton's law gives us conditions equivalent to evaporation under partial vacuum. Liquors containing substances which readily dissociate at normal boiling-point may be handled with safety.

For instance, we have concentrated ammonium chloride solutions by a continuous process designed for the purpose, running the concentrated solution through a crystallizing pan with continual recovery of crops of crystals thrown out of solution. This has been accomplished with complete absence of dissociation, the depressed boiling-point in this instance being approximately 20° C. below the normal.

A further test which will be of interest is the application of submerged combustion to Chilean nitrate liquors.

Hydrolysis of the magnesium salts present, with consequent evolution of hydrogen chloride, has long been a serious factor encountered in the Chili nitrate industry. The well-known highly corrosive nature of the fumes driven off has precluded the use of closed vessels of any kind for treatment of the liquors. Decomposition of sodium iodate present also takes place in the steam-heated open leaching tanks in use.

Objects of the Tests.

These tests were undertaken to decide whether these features, always met with in the behaviour of nitrate liquors normally steam-heated, were accentuated, or whether the contentions of the author could be substantiated, and that such influences would be absent in nitrate liquor treatment on the Hammond system of submerged combustion.

The objects of inquiry were, then, to examine submerged combustion as a means of heating, particularly for evaporation, in the nitrate industry, with special reference to:

1. Thermal efficiency.
2. Possible hydrolysis of magnesium chloride present, with evolution of hydrochloric acid.
3. (*a*) Possible catalytic influences of iodates on this hydrolysis.
   (*b*) Possible evolution of iodine as such.

It was definitely ascertained that in the treatment of nitrate liquors by submerged combustion that:

(1) A thermal efficiency of 90 p.ct. on the net calorific value of the gas was obtained.

(2) Hydrolysis of magnesium salts, with evolution of hydrogen chloride, is not considerable.

(3) (*a*) The presence of iodates has no great influence.
(*b*) The decomposition of iodates, with evolution of iodine, does not take place.

An application of submerged combustion of considerable interest lies in the preparation of "Stand" oil. Briefly, in this

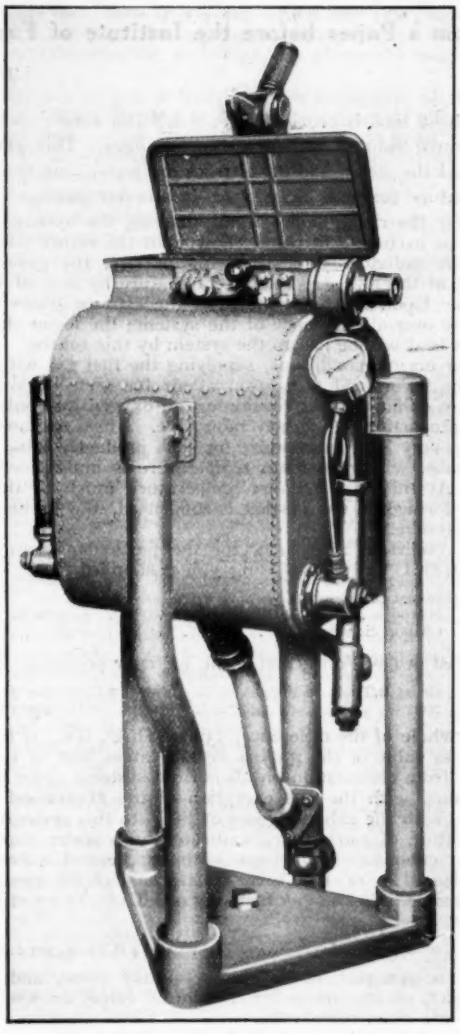


Fig. 2.

process ordinary linseed oil is polymerized by being held at a temperature in the neighbourhood of 300° C. for as long as is necessary to attain the desired body. Ready control of the temperature is essential.

On the Hammond system the burner operates submerged directly in the oil, bringing it to 300° C., and, at a much reduced input of fuel, holding it there. A slight deficiency of air to avoid oxidation is supplied.

Not only does the burner function perfectly in these trying conditions—submerged in a vegetable oil at 300° C.—but the essential ready control of temperature is present.

On the semi-large scale work completed (work of the full commercial scale is now in active development) the oil produced was bright and clear and of a pale colour, showing not the slightest sign of charring, while the chemical features of low acid value of the product are considered very valuable.

At the same time, such is the high efficiency of utilization of the heat of the town gas supplied that the method shows a fuel

cost of less than one-quarter that in normal external firing practice.

The capabilities of the burner made evident in this application will show how a delicate substance highly susceptible to injury can be handled on this system with due regard to quality and economy. The vessel and combustion unit casing for this process are of all aluminium construction, the general arrangement of the air lift circulator trunk and the deflector are similar to the internal arrangement of the stoneware vessels for chemical concentration, the inner classifier vessel only being omitted.

Oil boiling units of one ton capacity are now under construction. These are equipped with combustion units of 250,000 B.Th.U. per hour capacity, a working temperature of 300° C. being reached in from three to four hours, after which the temperature is held by a reduction of the input to one-fifth the initial rate.

Fig. 2 shows the application of submerged combustion to dyeing and kindred processes. The photograph is of a Hammond vortex dyeing drum. This machine has a nominal capacity of 14 gallons, and is designed primarily for the dyer and cleaner who has to deal with made-up garments such as dresses, lingerie, felt hats, hosiery, and other small articles in small batches or single pieces. The combustion unit is mounted in a circulator chamber connected to the rear of the vat. The rising main from this circulator delivers aerated liquor through a slotted opening across the whole width of the vat at the back.

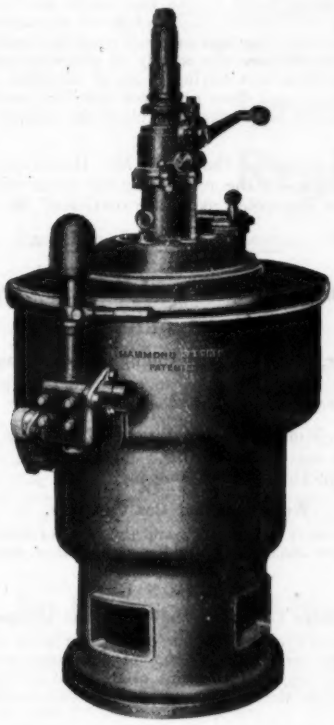


Fig. 3.

This aerated column of liquor creates an unbalanced effect in the main body of the liquid in the vat, the heavy side represented by the unaerated liquor in the front portion of the vat tends to sink by its superior weight, displacing the aerated side upward. The combustion gases come away continuously at the surface, and the result is a continuous rotary motion to the whole content of the vat. Liquor replacing that lifted by the combustion gases returns through a perforated inner wall at the front of the machine by way of the return pipe, clearly visible in the photograph. The machine is fitted with a vapour-tight lid and a spring-loaded outlet valve for the exhaust gases. The tension on this valve may be adjusted to maintain an internal pressure upon the system. This is provided for the purpose of increasing the working temperature above that normal to the system where this may be required. It is, however, being more and more borne in upon us by experience that the temperature normal to the system under atmospheric pressure is sufficient to bring about complete discharge of the colour from the dye bath on to the goods. We find in practice that the complete process is more efficiently carried out at a lower temperature when the submerged flame is used than that required for the same result when the vat is steam-heated. It will be evident to everyone that the process of dyeing wool fibres and woollen goods is one fraught with the danger of shrinking those goods if, as in orthodox practice, it has to be carried out at or near 212° Fahr. It has been found in practice that equal tintorial results can be obtained with better penetration at 180° Fahr. when using the Hammond process. This gives a very substantial margin of safety against damage by overheating. That this feature is even more important in the case of certain classes of artificial silks will be obvious.

The Hammond white metal melting machine now in process of development is illustrated in fig. 3. It has been designed to take the fullest advantage of the Hammond system of submerged combustion applied to the melting of white metals such as lead, tin, antimony, silver, and other fusible non-foaming solids of a similar or lower fusion point.

The machines are constructed with semi-steel bodies and covers, and associated working parts in mild steel, all of rugged design for continuous working under present-day industrial conditions.

The machine is heat insulated throughout, and the non-conductor lining is an essential and integral part of the machine. The standard type incorporates an under-furnace, taking the form of a gas-fired surface combustion tile for preliminary heating.

The Hammond precision pouring valve is employed to provide an unusually exacting control for continuous and intermittent tapping. In the large machine it is arranged as an integral part of the machine. In the smaller size the valve is arranged as an external fitting, and is exhaust jacketed to prevent freezing. All machines are provided with a content level indicator and two thermometers.

The feed hopper is of ample dimensions, and is provided with a fully insulated cover. This hopper permits of feed of cold or preheated incoming material under hydraulic seal.

A hand control geared lift is employed for raising the combustion unit clear of the metal when closing down for lengthy stand-by periods. In the larger size the transfer chamber of the combustion unit is water-cooled. In all sizes the combustion unit may be removed from the machine by the withdrawal of a single nut. This type of machine has been designed in two sizes, and these have the following characteristics:

Machine size No. "0," having a fuel consumption 0·6 therm per hour, town or producer gas. Weight of machine empty 1555 lbs.

Machine size No. "0A," having a fuel consumption of 2·25 therms per hour, town or producer gas. Weight of machine empty 4400 lbs.

Tests already completed indicate that the following performance may be expected:

Capacity when working on Pouring at	Lead. 400° C. 752° Fahr.	Tin. 300° C. 572° Fahr.	Type-metal. 400° C. 752° Fahr.
Machine size "0"—			
Capacity, lbs.	700	450	620
Throughput, lbs. per hour	1100	800	850
Machine size "0A"—			
Capacity, lbs.	3200	2050	2950
Throughput, lbs. per hour	4480	3260	3460

The method of controlling the fuel and air is by means of a special proportioning valve. This valve is of the piston type, having no glands, the valve being rendered gas-tight by means of piston rings. The air and gas are controlled by ports in the piston registering with inlet and outlet ports in the body of the valve.

These are so arranged and proportioned that rotation of the piston varies the cut-off on the gas port without varying the cross-sectional area on the air port. Axial travel of the piston varies both the air and the gas in like proportion. This gives a roughly correct proportion of fuel and air for hand control, and hand adjustment is made finally to correct the mixture to meter readings.

For accurate work a further addition to the valve takes the form of a calibrated cam which automatically corrects the mixture by giving the piston a rotary motion during its axial travel, the simultaneous movement provides a mixture correct to 0·5 of 1 p.ct. For everyday commercial work there has been introduced a valve working on the high-low principle, operating through calibrated orifices which are sent out under seal. This type of valve is adequate to fill most commercial needs, but is not, of course, such a highly scientific instrument as the universal type. The latter can be fitted with a hydraulic head for control through the agency of a thermostatically operated relay. The air and gas is supplied to the burner by a booster of the rotary type. In this the air and gas are compressed to the pressure required, normally 5 lbs. per sq. in., by two separate boosters, one for air and one for gas, assembled on the same shaft, and driven by an electric motor coupled directly to the end of the shaft, controlled by automatic switchgear. A by-pass valve is fitted on the discharge side of the gas booster, its function being to retain the pressure of the gas at 5 lbs. or as required, and by-pass any surplus not being used back to the gas main. A relief valve of similar construction is fitted on the air discharge side. The gas inlet is coupled direct to the gas supply, and the air inlet is fitted with an efficient silencer. The booster is very silent while running, and there is an almost complete absence of vibration. Sets have been designed with an output of from 120 c.ft. of gas and 540 c.ft. of air per hour (equivalent to 60,000 B.Th.U. per hour with gas at 500

B.Th.U.) to 2000 c.ft. of gas and 9000 c.ft. of air per hour (equivalent to 1,000,000 B.Th.U. per hour), the power of the motor required varying from ¾ H.P. in the first case to 7½ H.P. in the last.

On the larger installations, de-loading valves governed by the pressure on the supply lines will be fitted to the intake side of the boosters, so that the power consumption will be closely proportional to the demand made upon the gas and air supply by changing conditions in the plant which the booster serves.

Discussion.

The CHAIRMAN asked if Mr. Hammond had been bothered by the corrosion of the pipes of his plant, due to the action of the SO_2 in the gases. Again, did Mr. Hammond consider that his system could put up a sporting fight against anthracite for the heating of a large building?

Mr. HAMMOND, replying, said that SO_2 existed, of course, in all town gas, but corrosion was conspicuous by its absence. He and his colleagues had been working a central heating plant of 60,000 B.Th.U. per hour output for two years, and had not found any corrosion such as would be normal in existing hot water work. They were still looking for the ultimate home of the sulphur. He believed he could show that anthracite systems could not ultimately compete with his system, for the reason that it was impossible to control thermostatically an anthracite or other solid fuel stove. If one damped down the fire, one converted the firebox into a low-temperature carbonization chamber, and this was not economy; what should be burned was being sent up the chimney as combustion gases.

Prof. J. W. HINCHLEY said he had followed Mr. Hammond's work for some time, and had seen his apparatus in use on several occasions, and had been impressed always by the fact that it was so thoroughly practical; the mechanical work was of a quality which could not be bettered. The great feature of the burner was a very simple one—*i.e.*, the intimate mixture of the materials before they were burned. He would like to see burners of this type made very much smaller than those described in the paper, and used for such purposes as welding, because the flame which issued from the bottom of the burner was homogeneous, and the temperature was beyond that which could be obtained with the ordinary blowpipe. He believed the temperature in the burner would be found to be nearly 3000° C. A flame with such a temperature—uniform, non-reducing, and non-oxidizing—should have very important practical qualities which were not present in an ordinary blowpipe flame. He was anxious to see the burner applied to the concentration of sulphuric acid, for which it was eminently adapted.

Mr. J. L. HODGSON, in an expression of admiration of Mr. Hammond's system, said that a feature which had impressed him was the enormous amount of heating surface obtained without the use of boiler tubes, combustion space, and things of that kind. From a cubic foot of gas one could get more than 1½ acres of heating surface in the simplest possible way, without any mechanical devices being used to produce it. He was lost in admiration for the system; it had an immense future. With regard to the 106 p.ct. efficiency that had been mentioned, he said that, where one was using it for heating buildings or other such purposes where one was going to reduce down to atmospheric temperature, it was all right to take the gross calorific value; but where one could not do that it was best to take the net value.

Mr. HAMMOND mentioned that the fuel cost for boiling 1 ton of the oil by the method employed in one works with which he was concerned was 25s. 7d., but he and his colleagues were quite prepared to offer to do it for 5s. Mr. Hammond then went on to describe, by the aid of lantern slides, a theory he had evolved to account for improved dye penetration.

Mr. H. R. HEMS (City of Birmingham Gas Department) said he had followed Mr. Hammond's work very closely since it was first introduced to the town gas industry, and he had every admiration for the way in which Mr. Hammond had tackled the problem of the proportioning and the mixing. There had been considerable developments in that direction so far as gas apparatus was concerned, but Mr. Hammond's combination of two methods had gone beyond anything that had yet been put forward by anyone else. He had had the opportunity of trying out to some extent the small central heating unit, and it had worked quite satisfactorily. Like all new things of that type, it had created such an interest that it had been almost impossible to carry out a continuous test over a fairly long period, but he hoped to be able to carry out some real basic tests of it. He agreed that there were many uses to which Mr. Hammond's burner could be applied, in addition to submerged combustion, and if the proportioning bell and mixer devised by Mr. Hammond were tried out, he was sure it would be found that the efficiency and general working of a number of plants, particularly industrial town gas plants, could be increased.

Mr. W. J. A. BUTTERFIELD, after congratulating Mr. Hammond on the very great progress he had made, testified, from analyses of the effluent gases from the Hammond burner, that the combustion of the gas was as nearly as possible complete, even in the very difficult conditions to which the flame was subjected. He was not very much surprised that Mr. Hammond had found the greatest immediate outlet for his burner in its application to central heating. In the big American cities, where the consumption of electricity per head of the population was three or four times as great as in this country, nevertheless the consumption of town gas was also very much greater per head of population than here, and this was due very largely to the wide adoption of gas for central heating plants. Notwithstanding the cheapness of oil and the facility with which anthracite could be obtained, the people preferred to use gas for central heating plants because it was thermostatically controllable, and needed no attention, except very occasionally. A friend of his, who was living in a small house, had introduced into it one of the American gas central heating plants, and had found that the cost even here was no greater than the cost of the anthracite installation used previously. Bearing in mind that the efficiency of the gas water heating plant was not so high as that of Mr. Hammond's submerged combustion system, one could quite believe that this system had the makings of a competitor against other central heating plants in which coke and anthracite boilers were used. The one "snag" that he saw in the use of Mr. Hammond's system was the dependence upon the continuity of the supply of electric current; if his motor stopped, the installation was out of action. The great advantage of the use of gas for central heating plants was that one could depend upon continuity of supply; and he asked what Mr. Hammond thought of the application of his system as compared with the less efficient gas heaters of existing types.

Mr. HAMMOND agreed that the problem of dependence upon the continuity of electricity supply was one which required a great deal of attention, and it had been necessary to afford protection by means of a servo circuit, which would shut the plant down automatically in the event of a failure and start it up immediately the supply was re-established. Provision had to be made, of course, for stand-by in cases where the system was used for certain chemical processes. In that case a booster was used in conjunction with a storage system, where the air and fuel were stored under a reasonably high pressure. It meant additional cost, but it gave that factor of safety which was necessary perhaps to a marked degree in certain chemical processes. It had been necessary to get the compressor manufacturers to collaborate in evolving a better class of booster than that available hitherto, and they had set to work and had provided boosters which he and his colleagues believed would be as near 100 p.ct. reliable as they could be. The only thing remaining was to provide that 100 p.ct. reliability on the electrical circuit; he did not see how they were ever going to get it, but they might get fairly near to it. Possibly, on big installations, there might be a stand-by installation on a separate circuit. The gas industry could pat itself on the back in this connection, because the supply of gas was much less liable to fail. The problem was having a lot of attention, however, and he did not think it need deter one from installing such a system in a house. He would be prepared to place the system in the hands of a housemaid.

In proposing a vote of thanks to Mr. Hammond, the CHAIRMAN commented upon the extraordinary unanimity of opinion which had been expressed as to the merits of Mr. Hammond's system.

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDERS.

Rochester, Chatham, and Gillingham Gas Company.

To extend the limits of supply, to make financial provisions, and for various other purposes.

Wandsworth, Wimbledon, and Epsom District Gas Company.

To provide for the transfer to the Company of the undertaking of the Kingston-upon-Thames Gas Company.

Wolverhampton Gas Company.

To authorize conversion of stock and the issue of additional capital, to prescribe a new sliding-scale, and to make other provisions.

SECTION 1.

Cambridge University and Town Gas Company.

To authorize the Company to borrow on mortgage of their undertaking, or by the creation and issue of debenture stock, any sum not exceeding the aggregate amount of the paid-up share capital of the Company for the time being and of any premiums paid in respect thereof.

Leatherhead Gas and Lighting Company.

To increase the borrowing powers from 50 p.ct. of the paid-up share capital to 75 p.ct.

SECTION 6.

Bolton Corporation.

The Corporation shall, from April 1, charge according to the number of B.Th.U. supplied, and shall on or before March 1 give notice of the calorific value of the gas they intend to supply.

The maximum price in respect of gas supplied by the Corporation shall be 9·6d. per therm.

Egremont Urban District Council.

The Council shall, from April 1, charge according to the number of B.Th.U. supplied, and shall on or before March 1 give notice of the calorific value of the gas they intend to supply.

The maximum price in respect of gas supplied by the Council shall be 13·2d. per therm.

Tyldesley-with-Shakerley Urban District Council.

The Council shall, from April 1, charge according to the number of B.Th.U. supplied, and shall on or before March 1 give notice of the calorific value of the gas they intend to supply.

The maximum price in respect of gas supplied by the Council shall be 12d. per therm.

DECLARATIONS OF CALORIFIC VALUE.

Bolton Corporation.—450 B.Th.U. (April 1.)

Tuxford and District Gas Light and Coke Company.—475 B.Th.U. (July 1.)

Wallingford Corporation.—500 B.Th.U. (April 1, 1930.)

Parliamentary Intelligence.

[From Our Special Correspondents.]

House of Lords.

Special Orders.

The following Special Orders, having passed the Special Orders Committee, have been approved by the House: Rawmarsh, Halstead, and Padiham.

The following Special Orders have been laid before the House and referred to the Special Orders Committee: County Borough of Bury, and Grange and Cartmel District Gas and Waterworks Company.

Private Bills.

The Ascot District Gas and Electricity Bill has passed its Second Reading, and is awaiting the appointment of a Select Committee.

The following petitions have been presented against Private Bills:

Name of Bill.	Name of Petitioners.
Ascot District Gas and Electricity	Urban District Councils of Windlesham and Egham, and Rural District Councils of Chertsey, Easthampton, and Windsor.
London United Tramways . .	Kingston-upon-Thames Gas Company, and Wandsworth, Wimbledon, and Epsom District Gas Company.
Llanelly District Traction . .	Llanelly Gaslight Company.
Middlesex County Council . .	Gas Light and Coke Company.

House of Commons.

Special Orders.

The following Special Orders have been approved by the House: Halstead Gas Company, Ltd.; Rawmarsh Urban District Council; Padiham Urban District Council.

The Grange and Cartmel District Gas Order has been presented to the House and ordered to lie upon the Table.

Plans have been deposited in connection with the Wandsworth, Wimbledon, and Epsom District Gas Order.

Coal Mines Bill.

Captain AUSTIN HUDSON, M.P. for North Hackney, and Commodore KING, who was Minister for Mines in the late Government, have put down the following new clause on behalf of the Conservative Party:

"Unfair Discrimination not to be Shown against Gas Undertakers."

"After a scheme has been approved or made by the Board of Trade in accordance with the provisions of Part I. of this Act, the owners of coal mines shall not in respect of any coal sold or supplied by them, which is used or intended to be used for carbonification or gasification, show any undue preference in the matter of prices in favour of such coal as against coal of the same nature and grade supplied to gas undertakers."

Register of Patents.

Automatic Ignition for Gas Stoves.—No. 299,470.

JEANNERET, B. H., of Le Locle.

No. 31,121; Oct. 26, 1928. Convention date, Oct. 28, 1927.

This invention relates to an automatic ignition installation for gas stoves of the type comprising a spark-producing device normally positioned at a distance from the gas burner, and means operatively connected with the gas valve to bring the spark-producing device into proximity of the burner when the valve is opened, and to return the device into normal position after the ignition.

The operating means comprises a spring controlled pawl pivoted on a rotating part of the gas valve, and a slidably mounted rod co-operating with the pawl in such a manner that, upon opening the valve, the pawl actuates the rod to bring the spark-producing means into proximity of the burner, and after ignition the pawl is held in inoperative position by the rod.

Gas Burners.—No. 309,580.

GUHL, H., of Karlsruhe i/Baden.

No. 9143; March 21, 1929. Convention date, April 13, 1928.

This invention relates to gas burners of the type having two flame rings supplied by independent mixing tubes.

The burner consists solely of two parts—a one-piece head, preferably formed in one with the mixing tubes, and a single burner cover. The head of the burner is so constructed that it carries at its upper end the apertures for the small flame ring as well as for the large flame ring, while the burner cover is constructed with a smooth contact surface, has no burner openings, and is laid loosely on the upper surface of the burner head. Consequently the position of the two flame rings relatively to each other is fixed once and for all, and all intermediate members, such as mushroom shaped devices placed under the burner cover, rings, and the like, are dispensed with.

The burner openings of the two flame rings are preferably arranged alternately round the periphery of the head, and the latter and mixing tubes are preferably cast in one piece. The upper surface of the burner head may be plane or may form a re-entrant conical or spherical surface. As a strong overheating of the burner head detrimental to the formation of the air-gas mixture can easily occur in such a burner, the cover may be provided on its upper surface with ribs.

Automatic Control of Water Gas Plants. No. 310,508.

HUMPHREYS & GLASGOW, LTD., of Victoria Street, S.W. 1 (Assignees of SOCIETE DE CONSTRUCTION D'APPAREILS POUR GAZ A L'EAU ET GAZ INDUSTRIELS, of Paris.).

No. 6949; March 4, 1929. Convention date, April 27, 1928.

This invention relates to an improved control apparatus for obtaining automatically a series of operations which are repeated periodically according to a fixed cycle and particularly to apparatus of the kind comprising continuously power driven rotary cams which actuate levers and control the time and sequence of operation of the members to be operated.

In known control apparatus used in the manufacture of water gas, state the patentees, the cam actuated levers serve only to establish and again disestablish a system of mechanical transmission between a power source and a member to be operated; or the cams serve to operate the distributing valves of a servo motor through which the desired operation is effected.

In apparatus according to this invention, automatic movement of the parts to be operated is obtained by power transmitted through continuously power driven cams and a system of levers which are themselves connected to the members to be operated or to the servo motors which actuate the same. Tappets and stops on the moving parts co-operate to stop automatically the apparatus when defective working occurs.

The devices described and illustrated in the specification have been so designed as to provide, in addition to the automatic movement, manual control of the members in case these should not function automatically, easy and rapid transfer from one system of operation to the other, and shutting-down of the system by an abrupt return to the position of rest when any disturbance takes place in the working and variation of the length of the cycle and of the speed at which the different movements take place during this cycle.

Geysers.—No. 323,807.

CHAPMAN, F. W., of Thornton Heath.

No. 29,376; Oct. 11, 1928. No. 3912; Feb. 5, 1929.

According to this invention, a geyser is so constructed that the enclosed central space, to which the gases of combustion first pass, is surrounded by a water space through which pass tubular ducts extending between apertures formed in the inner and outer walls of the water space. They extend over a substantial part of the height of the walls, and preferably consist of horizontal rings of perforations so that some of the gases can flow outwardly at the lowermost ring of perforations and can gradually escape to the flue (though, of course, some of the gases rise higher, and leave by the uppermost perforations or through one or more intermediate rings). As a result, the gases do not need to rise to the top of the inner vessel and then completely to descend again.

In one known form of open geyser, states the patentee, a corrugated cylinder surrounding the central combustion space is perforated by a number of holes near its lower edge and a few holes near its top which provide passages for the gases to the flue pipe. Boilers such as are used for supplying hot water in restaurants have been formed with a central water jacketed member, from the inner space of which the gases of combustion escape through one or more holes at the top of that member; but the present invention is concerned entirely with geysers in which the water is constantly flowing from the inlet to the outlet.

In the chamber type of sealed geyser according to the invention, it is the boiler vessel whose double walls are formed with the rings of perforations; but in the case of an open geyser, both the inner and the intermediate vessels are perforated.

The boiler space does not extend to the base of the geyser, so that part of the hot gases can flow directly from the burner around the boiler. The result is, observes the patentee, that there is not a tendency to choke back the products of combustion. Further, the ven-

tilation provided by the apertures ensures more complete combustion. This allows the geyser to take gas at a considerably higher rate, and further allows the boiler space to be lengthened considerably without danger of smothering.

Waste-Heat Boilers.—No. 324,111.

SOUTH METROPOLITAN GAS COMPANY, and CARPENTER, C. C., both of 709, Old Kent Road, S.E. 15.

No. 30,181; Oct. 18, 1928.

This invention is concerned with the construction of the vertical type of boiler used for the recovery of waste heat from furnace gases. A steam boiler comprises, in combination, a smoke box mounted intermediate the ends of the boiler and providing two interconnected drums, a centrally located flue passing through one of the drums for leading the heating gases to the smoke box, which flue, at its other end, is adapted for connection to a furnace flue. There are coincident sets of tubes in each drum, through one of which sets of tubes the gases pass from the smoke box to exhaust, and the other set of which are closed at their ends by bungs. The set of tubes which are closed at their ends are preferably of larger diameter than the other set, and the boiler may be constructed from two independent concentric drums, one of which encircles the smoke box; fluid connection between the drums being obtained through holes in the shell of the inner drum. Preferably also the central flue extends beyond the baseplate of the drum through which it passes, and is surrounded with a concentric sleeve in fluid communication with the drum, the gases from the boiler tubes passing into a second smoke box before escape to the chimney or other exhaust. The baseplate of the adjacent drum bounds a part of the chamber, and the extension of the central flue passes therethrough.

In a vertical steam boiler, the upper or steam drum may be provided with a steam dome, and downcomer tubes are provided interconnecting the two drums.

In a boiler constructed in accordance with this invention, state the patentees, the smoke tubes may easily and quickly be cleaned without in any way affecting the working of the boiler except that flue which is being cleaned; or, if necessary, a spent tube may be withdrawn. Furthermore, the path of the hot furnace or other gases is such that they will not contact with any part of the boiler skin where a sediment or incrustation is likely to occur until they have been appreciably cooled.

Lubrication of Gas Meters.—No. 324,168.

METERS, LTD., of Manchester, and GLOVER, W. T., of Oldham.

No. 34,577; Nov. 23, 1928.

This invention has for its object to provide simple and effective means for lubricating the stuffing boxes and moving parts of the meter.

A compartment is provided in the top of the meter above the bellows chambers, which has a connection to the outside of the meter to receive oil by grease gun or other means for charging the compartment with suitable lubricant. The compartment is above the valves, so that the oil will flow by gravity to the required points. Wicks extend from the compartment to touch the tops of the valve covers or slides, so that the latter will be wetted with lubricant as they reciprocate and come in contact with the wicks. Tubes also extend from the compartment to the stuffing boxes of the meter crank shaft and of the flagrods or upright spindles of the meter bellows or diaphragms. Such tubes supply lubricant by gravity or capillarity to the bearings and packings of the stuffing boxes.

Radiant Gas Burner for Baking.—No. 324,182.

PEEK FREAN & CO., LTD., and AITKEN, R., both of Bermondsey.

No. 36,539; Dec. 11, 1928.

This invention has for its object to provide improved means for radiating heat in chambers, such as biscuit making ovens, due to the combustion of gas emanating from tubular burners. The burner tube is employed to form directly part of a casing extending longitudinally of the tube and adapted to be filled with a plastic mass of refractory material which when set constitutes a baffle played upon by the flame and brought to a state of incandescence.

The surface of the baffle upon which the flame acts extends from one side of the flame orifices in the tube with a suitable inclination over these orifices, and the mass may increase in thickness in a direction away from the tube. Thus a sheet metal casing may be employed, riveted (say) along one edge to the burner tube, which forms the margin of the longest of three walls of different length considering the cross section, the intermediate side which is of intermediate length being (say) at right angles to the longest side, and making an acute angle with the third and shortest side. This third side may be coincident with the face of the filling of refractory material, which may be a mixture of kieselguhr and asbestos.

Such an arrangement, state the patentees, is relatively cheap to construct and can be renewed or packed with new material without difficulty.

Low-Temperature Coke Ovens.—No. 324,195.

DIAMOND, W., of Marley Hill.

No. 37,689; Dec. 20, 1928.

This invention relates to low-temperature coke ovens, of the kind in which movable liners are provided in the ovens to facilitate the withdrawal of the treated charge which, owing to expansion as a result of treatment, adheres to the oven walls.

The object is to provide a coke oven of this kind which shall be free of internal mechanism for controlling the liner or liners, and the control of the liner or liners effected from the outside. The liners are arranged so that in their normal position they are inclined to the oven walls, whereby, on imparting movement to one end of a liner, it will be withdrawn from contact with the charge. Each liner may be in the form of a plate of wedge section adapted to be raised by hoisting gear, so that when lifted it is eased away from the face of the charge. Alternatively, each liner may consist of a hinged plate adapted to be swung back by suitable gear away from the face of the charge. In operating the oven, the liner is moved away from the face of the charge at the end of the coking operation, the charge then being discharged.

Gas Burner Regulator.—No. 324,238.

FRICKER, E. H., of Exeter.

No. 2965; Jan. 29, 1929.

This invention relates to devices for regulating the supply of gas to atmospheric burners, in which means are provided for regulating both the pressure and the volume of the gas, such devices being of that type in which the gas is caused to pass between the coils of a spring into an outer chamber from which it issues through suitable perforations or apertures; the pressure being regulated by closing together or opening the coils of the spring, and a variation in the volume being effected by a rotatable member which is turned to cause the perforations or apertures to be more or less uncovered to meet requirements.

The outer chamber is arranged to screw on to a sleeve or inlet fitting attached to the end of the supply pipe, so as more or less to compress a coiled spring fitted between the sleeve or inlet fitting and a closure member located within the chamber at the outer end thereof; the closure member being capable of moving in an axial direction towards the sleeve, but being prevented from turning relatively thereto. The outer end of the chamber is apertured or perforated, and, as the latter is turned to compress the spring, these apertures, which serve for the outlet of the gas, are more or less obscured by the closure member, so that the same movement thus serves to vary the space between the coils of the spring and also the effective outlet opening in the end of the chamber, a variation both of the pressure and volume being thus obtained by a single control member.

Seals for Dry Gasholders.—No. 324,277.

SCHURMANN, F., KLONNE, M., and KLONNE, M., all of Dortmund.

No. 7316; March 6, 1929.

This invention relates to a sealing piston of a dry gasholder, the sealing ring of which piston is supported by an extensible sheet metal ring. The latter is made of corrugated sheet metal. This simplifies the manufacture of the ring and makes it more yielding, state the patentees. Preferably the corrugations of the ring are tapered downwardly, while the ring is rigidly connected at its lower end with the sealing piston. The connection may be made in such a manner that the lower edge of the sheet metal ring is bent inwards and upwards and is rigidly connected by its upwardly bent end with the sealing piston.

Several constructional examples of the invention are shown in the specification, two of which we reproduce here. Fig. 1 is a vertical section through one form, and fig. 2 a vertical section through a second form.

The sealing piston illustrated in fig. 1 consists of a disc-shaped member *a* which is provided with a shell *c*. At the lower end of the shell a liquid pocket *k* is formed. The piston *a* is provided with

Fig. 1.

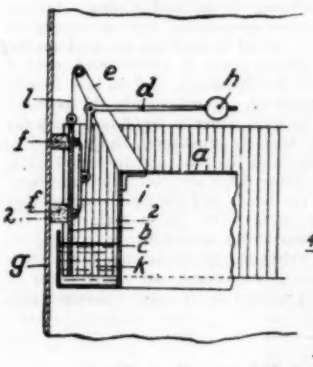
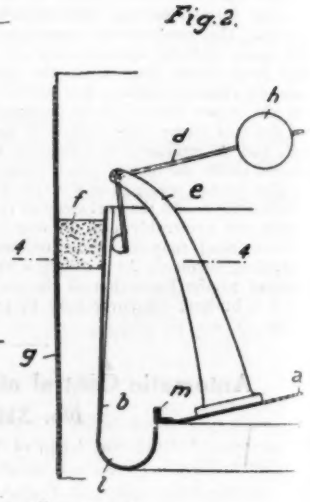


Fig. 2.



Sealing Piston of Klonne Holder.

supports *e*, to which an extensible sheet metal ring *b* is suspended by means of ropes. The ring consists of corrugated sheet metal. In the example shown it supports two sealing rings *f* which rest against the inner surface of the container *g*. Instead of two

rings, a single ring might be used; but more than two rings may also be used.

On the supporting members *e* cranked levers *d* are pivoted which support sliding weights *h*. The downwardly extending arm of the cranked lever *d* is pivoted to a bar *i* which is rigidly fixed to the corrugated sheet metal.

Through the weight-loaded cranked levers the sealing rings *f* are pressed by means of the corrugated sheet metal ring firmly against the inside wall of the container *g*, so that an effective seal is formed at this place. The lower end of the sheet metal ring *b* extends into the liquid pocket *k* so that a good seal is obtained at the lower end as well.

If it is desired to do without a liquid pocket, the constructional form shown in fig. 2 may be used. In this the corrugations of the corrugated sheet metal ring taper towards the bottom. In other words, the height of the corrugations decreases towards the bottom, such that the sheet metal ring is smooth at the bottom. In this form it is advisable to use a single sealing ring *f* only.

Thermostatic Control of Gas Burners.

No. 324,600.

LANGER, R., of Hindenburg.

No. 14,673; May 10, 1929. Convention date, March 14, 1929.

This invention relates to a thermostatic control for gas burners of the kind wherein a gas valve having a tendency to close is maintained in open position by a latch, a thermostatic element being employed which, on being heated by the flame, enters into operative connection with the latch, and which subsequently, on the flame being extinguished, operates the latch so as to release the gas valve. The object is to produce a very simple device of this kind.

Fig. 1 represents a sectional side view of the device, and fig. 2 is a top view.

Fig.1

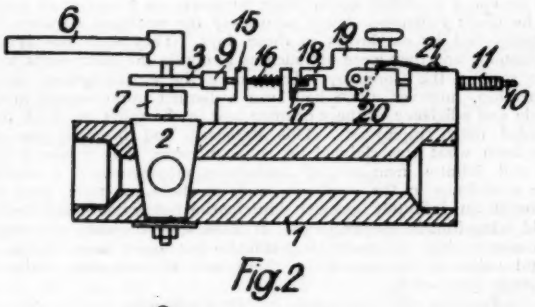
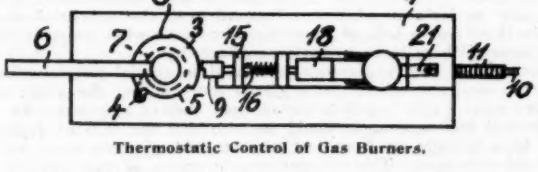


Fig.2



Thermostatic Control of Gas Burners.

The device comprises a casing 1 which is arranged in the gas conduit and which is fitted with a tap 2 whereby the conduit can be closed. A spring 7 tends to close the tap which is opened by means of a handle 6. A disc 3 mounted on the valve stem has a cut-away portion 5 forming shoulders which determine the end positions of the tap by abutment against a pin 4. The tap is maintained in open position by a latch 9 which engages another shoulder 8 on the disc 3. The latch is guided longitudinally in brackets 15, and is controlled by a spring 16 which tends to maintain the latch in engagement with the disc 3. At the tail end of the latch 9 there is a notch 17 in which engages the hook-shaped end 18 of a trigger 19 pivoted to a slide 20. The trigger is controlled by a spring 21 and is fitted with a key whereby it can be depressed for releasing it from the latch.

Arranged across the burner is a thermostatic element in the form of a bar, which is secured at one end by means of adjusting screws to a rigid supporting bracket. A wire 10 which is encased in a flexible sleeve connects the free end of the bar 12 with the slide 20 so as to impart movement to the latter owing to the contractions and expansions of the thermostatic bar. The latter is adjusted so as to maintain the latch 9 in engagement with the disc 3 while it is heated by the burner flame, and so as to withdraw the latch from the disc and release the tap when it contracts owing to the extinction of the flame.

When the flame is to be lit, the tap 2 is opened and the trigger depressed so as to release the latch, which snaps behind the shoulder 8 of the disc 3 so as to maintain the tap in open position. As the bar expands under the influence of the heat, it pushes the slide 20 forwards; and the trigger 19, the hook 18 of which is bevelled, then moves up on the tail end of the latch until the hook snaps into engagement with the notch in the same. Thereupon the latch will be controlled by the bar, which releases it automatically in case the flame should be extinguished.

Applications for Patents.

[Extracted from the "Official Journal" for Feb. 5.]

Nos. 2692—3535.

BOSCH AKT.-GES., R.—"Gas-burning apparatus." No. 3029.
CLUTTERBUCK, A. H.—"Gas oven burner." No. 3183.
FLETCHER, W. B.—"Carrying out gas reactions." No. 2730.
FLETCHER, W. B.—"Treatment of coke oven gas, &c." No. 2781.
FRANCIS, W.—"Carrying out gas reactions." No. 2729.
HARPER & Co., LTD., J.—"Gas cooking stoves." No. 3010.
HUMPHREY, S. W.—See Clutterbuck, A. H. No. 3183.
HUMPHREYS & GLASGOW, LTD.—"Manufacture of gas." No. 2759.
HUMPHREYS & GLASGOW, LTD.—"Method of making combustible gas." No. 2760.
HUMPHREYS & GLASGOW, LTD.—"Apparatus for the manufacture of gas." No. 2761.
HUMPHREYS & GLASGOW, LTD.—"Production of mixed oil gas and water gas." Nos. 2762, 3370.
HUMPHREYS & GLASGOW, LTD.—"Manufacture of combustible gas." No. 2915.
HUMPHREYS & GLASGOW, LTD.—"Purification of gas." No. 2916.
HUMPHREYS & GLASGOW, LTD.—"Manufacture of mixed oil gas and water gas." No. 3067.
IMPERIAL CHEMICAL INDUSTRIES, LTD.—See Francis, W., and Fletcher, W. B. Nos. 2729, 2730.
IMPERIAL CHEMICAL INDUSTRIES, LTD.—See Fletcher, W. B. No. 2781.
MASCHINENFABRIK AUGSBURG-NURNBERG AKT.-GES.—"Gasholders." No. 2901.
RETALLACK, J. F.—See Harper & Co., Ltd., J. No. 3010.
STRETCH, A.—"Mechanical gas-igniter." No. 3129.
TYRER, D.—"Cooling coke and obtaining a nitrogen hydrogen mixture." No. 2842.
TYRER, D.—"Production of ammonium sulphate." No. 3401.
WHEELER, T. S.—See Francis, W., and Fletcher, W. B. Nos. 2729, 2730.

[Extracted from the "Official Journal" for Feb. 12.]

Nos. 3536—4365.

ALDRICH, G. A.—"Gas analyzing apparatus." Nos. 3552.
COLLINS, T. B.—"Liquid fuel, gas, &c., burners." Nos. 3859, 3860, 3861.
GLOVER & Co., LTD., G.—"Casings of gas meters." No. 4041.
GLOVER & Co., LTD., G.—"Coin-freed mechanism." No. 4042.
IMPERIAL CHEMICAL INDUSTRIES, LTD.—"Water gas generators." No. 3567.
ROBINSON, C. G.—"Gas cookers." No. 3546.
SEIL, G. E.—"Gas burner and production of mixtures of air and combustible gases." No. 4260.
TYRER, D.—See Imperial Chemical Industries, Ltd. No. 3567.
WOLF, E.—"Doors of horizontal ovens for production of gas." No. 4071.

[Extracted from the "Official Journal" for Feb. 19.]

Nos. 4366—5181.

BARNES, R. H.—"Incandescent gas mantles." No. 4541.
BECKER, A. C.—"Gas pressure regulators for street lamps, &c." No. 4433.
DAVIES, A. E.—"Disposal of spent gas fumes from gas fires." No. 4967.
DEMPSTER, LTD., R. & J.—"Sealing means for waterless gasholders." No. 5106.
DIETERICHS, W.—"Regenerative ovens or furnaces." No. 4776.
GAS LIGHT AND COKE COMPANY.—See Dieterichs, W. No. 4776.
GAS METER COMPANY, LTD.—"Gas meters." No. 5156.
GIMPLE, G.—"Attachment for gas meters." No. 4550.
GREGSON, J.—"Apparatus for manufacture of gas." No. 4549.
JOHNSON, C.—See Gregson, J. No. 4549.
LUTZ, A. (LUTZ & GIMPLE GASMESSER U. APPARATEFABRIK).—See Gimple, G. No. 4550.
MCINDOE, R. W.—"Prepayment mechanism for gas meters." No. 4532.
NAAMLOOZE VENNOOTSCHAP SILICA EN OVENBOUW MIJ.—"Cooling hot coke discharged from coke ovens." No. 5031.
PAIN, W. F. and W. H.—"Gas pendants, &c." Nos. 4973, 5116.
PARKINSON & COWAN (GAS METERS), LTD.—"Bearings." No. 4899.
REGENT MALLEABLE CASTINGS, LTD.—See Davies, A. E. No. 4967.
ROBINSON, S.—"Gas meters." No. 4787.
SCHUH, E.—See Gimple, G. No. 4550.
SIMPSON, S.—See Robinson, S. No. 4787.
SMITH, E. W.—See Robinson, S. No. 4787.
SUGGITT, R. W. L.—"Combustible water gas." No. 4864.
TAUNTON, F. P.—See McIndoe, R. W. No. 4532.
UNITED GAS INDUSTRIES, LTD.—See Robinson, S. No. 4787.
VYSE, C.—See Dieterichs, W. No. 4776.
WEST, A. J.—See Gas Meter Company, Ltd. No. 5156.

Hornsey Gas Company.

Price Still Lowest in Metropolitan and Suburban Area.

The Annual Ordinary General Meeting was held at 5, Great Winchester Street, London, on Friday, Feb. 21—Mr. A. M. PADDON (the Chairman) presiding.

The SECRETARY read the notice convening the meeting, and the report and accounts were taken as read.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, referring to the accounts and dealing with the statement of capital stock, remarked that the figures had remained undisturbed during the period under review and were the same as twelve months ago, there being an amount of unissued capital of over £71,000. As regards the loan capital, there was a change advantageous to the undertaking. Under the provisions of the Gas Undertakings Act, 1929, which was a general Act and applied automatically to all gas undertakings throughout the country, the Company's borrowing powers were enlarged and authority was given to raise loan capital amounting to over £75,000. These powers might have been obtained by application to Parliament or to the Board of Trade; but it was a distinct economy and advantage that these additional capital powers had been obtained without such a procedure or expense.

As regards the capital account, there had been expended during the year some £25,000, and the authorized depreciation had been decreased by £3619 on account of the gasholders. The faculty of depreciation was a very valuable one to the Company, and the limited extent to which it was exercised indicated the excellent condition of the Company's assets. The new gasholder, which they had been compelled to erect, accounted for over £23,000 of the £25,000 capital expenditure during the year. This plant was brought into operation early last year and had been completely successful both in its design and construction, and further had proved of very great economic value to the technical policy of the Company. It would be seen that the capital expenditure had advanced until it now stood at £410 per million c.ft. That was higher than usual and higher than he would like to see it. It was a considerable increase; but their capacity for reducing it was to a certain extent curtailed by the excellent condition of the works and by the very low price at which gas was being sold in the district. As regards the revenue account, the figures were certainly extremely interesting. They were quite unique at the present time and hardly bore a close comparison with those of any other undertaking. That was disclosed in the first entry under the heading of "By sale of gas, &c." Gas had been sold at 7½d. and 7d. per therm during the last 12 months, and that was a much lower price than any other undertaking in the Metropolis, whether in the centre or the suburbs. During the past 12 months the price had been reduced from 8d. and 7½d. to the figures he had mentioned, and that difference of 1d. per therm amounted to £18,000 a year on a full year, and consumers would be better off to that extent. The actual amount charged less to the consumer during the 12 months amounted to £7360, as compared with the position if the price had been the same as in the previous year.

If that policy had been pursued, there would still have been a large practical commercial margin between the price charged in Hornsey and the price charged by the three great Central London Companies, and if this amount had been put back on the other side of the account, it would have meant an accentuation of profit which, without being exactly embarrassing would perhaps have been difficult to account for. That point would be made a little clearer when he came to deal with the revenue account.

RESIDUALS.

Working on such an extraordinarily low price, it would be obvious that the demands made upon the executive and the administrative were of an entirely abnormal character. If the receipts for gas and the ancillary amounts for meters, stoves, &c., were added together they came to £150,000, which was £3320 less than last year, whereas he had already shown that the reduction in the price alone accounted for double that amount. As regards residual products, coke had brought in nearly £3000 more than last year; but tar was almost the same amount less. Sulphate of ammonia had brought in £500 less; but they were extremely fortunate in being able to show a credit entry under this head, because a good many companies showed a debit. Those who showed a debit often said that others who did better than themselves did it as a matter of account. The Hornsey Company, however, did not plead guilty to this for a moment. There was the old saying that "he who excuses himself accuses himself," and when a large deficit was seen in that particular account it did not explain the matter to his own satisfaction by saying that somebody else did not keep their accounts as exactly as they should do. Sulphate of ammonia brought in £1313, and, in these depressed times in regard to residual products, it was remarkable that the total loss on residuals was only £748 as compared with a year ago on a turnover of £35,000 in residual products. He believed it would be agreed that this was a very creditable outcome of the year's trading. Altogether the receipts were reduced by £3597, which was only a little more than half what had been conceded by way of reduction in price.

The increase in the sale of gas was 2·7 p.ct., or some 22 million c.ft., and almost the whole of that accrued during the very severe weather last February. It was often said that these extreme temperatures contributed to the advantage of gas undertakings; but, as a matter of fact, it was quite otherwise, because there were extra expenses that had to be incurred in supplying abnormal quantities, and, moreover, the demand deranged the economy and order of the works processes. It had one other effect, however. Owing to the peculiar system of charge which still persisted in the gas industry and was a complete variant on other commercial practice, the unfortunate consumer got his aggregate accounts some time after he had incurred the cost, and for the rest of the year, instead of seeing how far he could take further advantage of the facilities and advantages of gas, he devoted himself to seeing how far he could evade its extended use. This matter would have to occupy the attention of the gas industry in an increasing degree of importance if the industry was to progress.

EXPENDITURE.

With regard to the expenditure side of the revenue account, there was not a great deal of difference between this year and a year ago. Though more gas had been sold, the coal, oil, and coke carbonized item was only increased by £558. The carbonizing wages, as would be expected in results such as those shown in the accounts, were extremely low, only 2·3d. per 1000 c.ft. There had been a saving on repairs and maintenance of works and plant, but he could assure the shareholders that the plant had in no way suffered from that economy. The distribution of gas had cost £1400 more, and represented a figure of 3·8d. per 1000 c.ft.; but all money spent in that direction in these days was even more valuable than it was 30 years ago, because the distribution side of an undertaking and the relations with the consumers were much more sensitive and more important to-day than they used to be.

Repairs and maintenance to stoves and fittings was an extraordinary figure—only £3577, or 1d. per 1000 c.ft., but that was due to the policy of the Company in the past in writing off this special form of apparatus and treating it rather as an increment than as a stable investment in the form of plant. In other companies it was the common thing to see this charge as high as 6d. per 1000 c.ft., because accumulations built up in the past still remained to be dealt with. There was also the pleasing little item that several hundred pounds less had been paid in rates last year.

Co-partnership had cost £204 more on a total of £2201; but important as was this entry in the accounts it in no way represented the real value of co-partnership to the undertaking. His mind went back for a great many years in the Hornsey Gas Company—more than he cared to reflect upon, some 30 years, as a matter of fact—and he could remember fairly accurately the relations between the Company and its employees in those days. They were not always satisfactory, and they were not such as to obtain the best results from those serving the Company. Ever since the establishment of co-partnership, however, there had been a distinct improvement in the morale and efficiency of the workmen and in the spirit in which they regarded their employers. This italicized and brought into definite form what was claimed for co-partnership, that it was a very real and definite insurance of continuous employment; it created more confidence in the employer, and, at the same time, gave the workman an infinitely greater anticipation of what good service would bring him in the long run. If these were the only advantages of co-partnership, it would be justified; but apart from the sentimental value of co-partnership, there was the economic value to everybody concerned.

A CO-PARTNER: We appreciate it, Mr. Chairman.

The CHAIRMAN said he was very glad to hear that remark. They had only to look at what was happening in the industrial world where there was a lack of co-partnership to see what co-partnership was accomplishing in its own sphere of activity.

The sum of nearly £4000 was carried to special purposes fund, and the total expenditure was £1200 more during the year; the profits were £4797 less and the receipts were £3597 less. In the profit and loss account it would be seen that the sum of £37,499 had been brought in from last account and £32,663 was carried forward this year. This amount was in excess of that allowed by Parliament, and though he believed that Parliament would agree that a very good practical attempt was being made to bring down this carry-forward and give the consumers and shareholders their share of it, it was perfectly obvious that some such reduction in the price of gas as had been made was necessary and might even perhaps have to proceed farther. The other items in the accounts did not call for a great deal of notice. The reserve fund was very small because it was young. The amount was only just over £7000, and it was practically all invested in gilt-edged securities outside the Company. The special purposes fund was a very important one, and a great deal of it was invested outside the Company. It was, however, really a floating fund to be drawn on or added to according to the requirements of the Company. In regard to the benefit fund account, it would be seen that they had only disbursed a small sum, but it fulfilled all their obligations. This fund had now been going on for some 14 years, but all obligations had been met. The requirements of the fund last year had only been £1024, whereas the appropriation from revenue account was £1791, and the fund in the aggregate now amounted to over £4000. The circumstances under which this fund received Parliamentary sanction, however, had entirely changed, because it was as far back as 1916 that statutory powers to create this fund were obtained, and in those days wages were about half what they were to-day. It was true that the cost of living had gone up tremendously, but there had also been a whole series of legislation tending to benefit the worker by mutual contributions from employer and employed in a way that the worker had no idea of getting at the time the fund was started. The fund was limited to a definite contribution from revenue account based on the sale of gas, and there was a definite limit with regard to its accumulation. All these circumstances were obviously inconsistent with the circumstances generally obtaining to-day. It might be said that he had shown that the Company was getting on very well as

regards this fund, and that was true; but it was necessary for the Directors to take technical and expert opinion as to what was involved in connection with power and privileges like that, and it was felt necessary that an actuarial estimate of this fund should be taken, and, if necessary, the future policy in regard to it must be accommodated to what that actuarial valuation disclosed. It was only due to the auditors that he should say this, because it was the intention of the Board that this matter should be dealt with in a proper and pertinent way, as was required in the case of all such funds publicly administered.

The Company's Investments.

Finally, he might mention that the Company's investments had a book value of £18,600, but the actual value was over £20,000, which must be considered satisfactory. The co-partners had a sum of £13,054 standing to their credit, of which over £10,000 was invested in the Company.

The interest in these accounts, of course, continued the Chairman, terminated on Dec. 31 last, and what really concerned the shareholders and the Directors most now was what was going to happen during the coming year. That, of course, he could not say, but he imagined the shareholders would expect some sort of more or less intelligent forecast, because it was necessary for the Directors to adapt their policy to what they thought lay before them. The future, however, was extremely uncertain. There were two causes of apprehension, one being the domestic anxieties peculiar to the undertaking, and the other a menace which affected the gas industry as a whole—viz., legislative changes and other possibilities. As regards coal, the Company had secured its coal supply so far as was possible by contract not only for the current year, but considerably beyond, and in that respect it might be thought that the Directors knew where they were. But they did not, because the Coal Bill was in a very uncertain state at the present time, and they could not tell how far its provisions might re-act upon the Company's dispositions with regard to coal. Contracts would not stand against everything, and one of the things they were not proof against was legislative enactment; and consequently that was a matter of anxiety. As regards the other matters, there seemed no reason for disquietude about residuals. There was no reason why coke should become a worse market. Indeed, he thought all the chances were that it would become a better one. In the old days gas undertakings used to complain that they could not sell their coke, but that was because they wanted to sell it in their own way, and people did not want it in that way. Consequently, there was an impasse, and coke was sold at ruinous prices throughout the country. The situation, however, was changed to-day. It had been disclosed that the most favourable customer for coke was the small user, if he could only get the coke in the form he desired. The demand had gone up, and there was now no difficulty in getting a fair price for it while giving the customer all that he desired. Therefore, he thought coke during the coming year would be more or less stable.

Tar and Bitumen for Roads.

As regards tar, he did not think it could get very much worse. The tar industry, important as it was to the gas companies, was a competitive one with the residuals products from mineral oils. He personally had given this matter a great deal of practical study in years gone by, and he believed there was room for both products. He had an illustration the other day in the Far East, where there were gas and mineral oil interests in competition. In order to deal with the tropical or sub-tropical conditions there, neither tar nor bitumen filled the programme for road purposes, and there had been mutual co-operation between the producers of tar and bitumen by which the two products were combined in order to produce a more satisfactory dressing for the roads. The roads in this country, of course, were not quite the same as they were in Asia or India; but they had many attributes in common, and he had great hopes that both sources of supply might be co-operatively used for the dressing of roads in this country. It was commonly known that the extension of roads was rapidly proceeding here, and he had not yet heard of any accepted dressing by bitumen or tar alone. He hoped, therefore, that a combination of the two would prove to be the real solution, and that this would be followed by fair prices for the producers.

Not much was to be expected with regard to sulphate of ammonia. The synthetic production of ammonia went on, and that had the effect of reducing the price; but there was an economical and commercial limit to the production of ammonia synthetically, whereas in the case of the gas industry there was no such limit. They had to produce it or get rid of the raw material. It was *force majeure;* but he had been in touch with very good sources of information, and was inclined to the opinion that the synthetic production of ammonia had very nearly reached its economical limit. He did not think it could be produced much more cheaply, and if the Company could show a small profit he felt they would have to be content and at the same time be thankful that there was not a loss.

He then moved that the report and accounts be received and adopted.

Mr. G. W. Carey (Deputy-Chairman) seconded.

Captain H. T. Wilkinson said he had listened with great interest to the Chairman's speech; but there was one point concerning the reduction in the price of gas. He would like some assurance that the reduction in the price of gas had not resulted in any variation in the quality of the gas.

The Chairman gave Captain Wilkinson this assurance.

The report and accounts were then carried unanimously.

Declaration of Dividends.

The Chairman then moved:

That final dividends for the half-year ended Dec. 31, 1929, be paid as follows: On the preference stock, 5 p.ct. per annum; on the 5 p.ct. stock, 7½ p.ct. per annum; and on the 3½ p.ct. stock, 6 p.ct. per annum (all *less* tax), making, with the interim dividends already paid on the 5 p.ct. stock and the 3½ p.ct. stock respectively, 7½ p.ct. and 6 p.ct. for the year, and that such final dividends be paid on Saturday, March 1 proximo; and that the sum of £633 be transferred to reserve fund.

Mr. F. H. Jones seconded, and the resolution was carried unanimously.

Re-Election of Retiring Directors.

The Chairman, proposing the re-election of the retiring Directors, Mr. F. H. Jones and Mr. T. W. Seager Berry, said the accounts of the Company were somewhat unique, and nobody could question their excellence. They indicated the strong position in which the Company had been placed, and, of course, the difficulty in the future would be to maintain that standard.

Mr. E. L. Burton seconded, and the motion was carried unanimously.

Re-Election of Auditor.

Mr. K. R. Mackay proposed, and Mr. H. P. Bodkin seconded, the re-election of Mr. H. A. Floate as Auditor of the Company. The motion was carried unanimously.

Vote of Thanks to Staff.

The Chairman then proposed a cordial vote of thanks to the Engineer, the Secretary, executive staff, and co-partners in the undertaking. The satisfactory report and accounts, he said, were really a vote of thanks to all concerned in the undertaking, because the position had only been made possible by whole-hearted and enthusiastic work from top to bottom. In their Chief Engineer, Mr. Buckley, they had a gentleman of exceptional technical ability; but while there were many engineers of high technical ability, it was not always that an engineer was found who also had the high commercial ability possessed by Mr. Buckley. When Mr. Buckley spent £1 for the Company he always got 25s. value, and that was the secret of the success of the Hornsey Gas Company. Again, in Mr. Mortimore, their Secretary, they had an officer of great ability who served the Company faithfully and with great assiduity. The remainder of the staff and the workmen equally served the Company faithfully and with great skill, and it gave him the greatest pleasure to propose this vote of thanks to them all.

Mr. F. H. Jones, seconding the vote of thanks, and at the same time expressing his acknowledgment of his re-election as a Director of the Company, remarked that he was proud to be a Director, because the Hornsey Gas Company was selling gas not a few decimal points cheaper than anybody else, but very much cheaper; and it had done so for a long time. The Chairman had made some kind remarks about his colleagues, and though the resolution he was seconding did not include the Chairman, he did not propose to exclude him from what he was now saying. The Hornsey Gas Company was in the satisfactory position it was because it had been led and directed by Mr. Paddon for some 20 or 25 years. In the same way they had had the valuable services of Mr. Buckley as Manager for very many years, and he also had had working with him a large number of people for a very long period. The present position of the Company was due to the definite policy laid down years ago, and the present very low price was the result of that policy and the manner in which it had been carried out under the direction of the Chairman and Mr. Buckley and the staff generally.

The vote of thanks was carried with acclamation.

Mr. J. W. Buckley (Engineer and General Manager) acknowledged the vote of thanks on behalf of the officers and staff and himself, and said how it would be appreciated by the workmen and staff when it was brought to their notice. There was little doubt that the success of the Company was due to team work from the highest to lowest. A great deal of this was due to the fact that the workmen were made comfortable in their employment; and the institution of co-partnership by the Chairman some years ago was an important factor in this.

Mr. K. Leslie Mortimore (Secretary) associated himself with the remarks of Mr. Buckley, and thanked the Board and the shareholders for their appreciation of the staff and workmen.

Vote of Thanks to Chairman and Directors.

Captain H. T. Wilkinson proposed a hearty vote of thanks to the Chairman and his co-Directors for the work they had done during the past year.

Mr. A. H. Godwin (a co-partner) seconded.

The Chairman acknowledged the vote of thanks, and the proceedings closed.

Results at Bridgnorth.—The report of the Bridgnorth Council Gas Undertaking for the past year states that the revenue account showed a surplus of £1704, against a surplus last year of £2070. The decrease is due to the price being reduced, and reduced income from the sale of residuals. The net revenue accounts showed a credit balance of £7169, against a credit balance last year of £5352, or an increase of £1817.

Proposed Extensions at Oldbury.—The Gas Committee of the Oldbury Urban District Council have submitted quotations amounting to £11,850 for the extension of the retort house at the gas-works. At the same time the Manager reported as to the necessity for the extension, which, he said, would increase the capacity by 50 p.ct. The Council have decided to apply to the Ministry of Health for sanction to borrow the sum required.

Bournemouth Gas and Water Company.

The 109th Ordinary General Meeting was held at the Offices of the Company, 48, Copthall Avenue, London Wall, E.C. 2, on Friday, Feb. 21, 1930—Mr. WILLIAM CASH (Chairman of the Company) presiding.

The SECRETARY (Mr. H. A. Plumb) read the notice convening the meeting, and the minutes of the previous ordinary general meeting were read, confirmed, and signed; and the Secretary sealed the list of proprietors.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, before moving the adoption of the Directors' report and the accounts for the year to Dec. 31, 1929, said it gave him great pleasure to present the accounts, because he believed it would be agreed that they were entirely satisfactory, and recorded once more the extraordinary progress which this Company continued to make. In the third paragraph of the report there were two special matters mentioned as having arisen in the year 1929. During the summer there had been an extraordinary drought, which had called for a very large supply of water; and in the early spring there had been an extraordinary demand for gas, due to the abnormally cold weather experienced at that time. It was a great satisfaction to the Directors, as he was sure it must be to the shareholders, that in both respects the Company had been able to meet fully all the demands made upon it by the consumers. For the whole year there had been an increased output of 177 million c.ft., or 7·89 p.ct., which, he considered, compared very well with the records of any other company. During the year 1929 the Company had sent out 2421 million c.ft. In 1919 the output had been 1286 million c.ft.; so that in ten years the output had been as nearly as possible doubled. The shareholders would not be surprised to learn, therefore, that a new vertical retort house was being erected at Pitwines, to enable the Company to meet the demands for gas. At the same time, in Bournemouth and district the demand for electricity was growing, and it was not unsatisfactory to be able to say that, in spite of that, there was ample room for both commodities. Recently, a prospectus had been issued by the Central Electricity Board in which some extraordinary figures were quoted showing the growth of the electrical industry throughout the country; the figures showed that in seven years there had been an increase of 120 p.ct. in the number of units generated. It must be remembered, however, that the figures included all the electricity generated and used for power and traction on the railways and tramways throughout the United Kingdom; they also included the figures for the non-statutory undertakings, and these public authorities and companies also supplied large quantities of electricity for traction purposes. That class of electricity was not in competition with gas at all. Therefore, when one saw such very large figures quoted—of which the electricity people were no doubt, and justly, proud—one could still feel sure that gas could hold its own and that there was room for both gas and electricity.

MR. MOON'S PAPER AT THE "B.C.G.A." CONFERENCE.

The experience of the Company in Bournemouth had been that there were numberless ways in which gas was used to a very large extent. The Company had sent out to the shareholders, with the accounts, copies of a paper read by their Engineer, Mr. P. G. G. Moon, at the British Commercial Gas Association's congress held at Eastbourne in the early part of the year. On behalf of himself and his colleages, the Chairman took the opportunity to congratulate Mr. Moon on that excellent paper, which was of value not only to the shareholders of the Company, but to the whole industry. It would have a particular interest, he ventured to think, for the Bournemouth shareholders; it was profusely illustrated, and he commended it to the very careful consideration of the shareholders. It did emphasize what gas was doing, and could do, and what the Company's officials and outdoor staff in Bournemouth were doing to popularize the use of gas, particularly with regard to heating. The paper contained a great deal of useful information, and set out the progress the Company had made over a period of years and the activities in which it was engaged. That being so, he did not propose to trouble the shareholders with any further information of that character.

FINANCIAL RESULTS.

Discussing the financial results of the year, he said it was shown by the gas revenue account that the cost of repairs of works in respect of the gas undertaking had decreased by £7126 as compared with the previous year. On the other hand, under the new statutory conditions applying to the Company, increased sums had been placed in the various funds. A larger sum had been placed to the special purposes fund, the increased amount so appropriated being £8869 for the complete year; the increase to renewal fund was £6079. Allowing for these substantially larger appropriations the amount carried to profit and loss account was only £1279 less than in the previous year.

On the other hand, he directed attention to the item in respect of rates. The Company had had to pay, for the moment, £9283 more in respect of rates in 1929 than in the preceding year. The hopes he had expressed in 1928, that reduced poundage might have assisted the Company, appeared not to have been realized. The rates problem, of course, extended to the water undertaking also, and rates in respect of the water undertaking had cost £2500 more than in the previous year. The water rentals had increased by £1387; but the cost of repairs of works was rather more than in the previous year. The contributions to the special purposes and renewal funds were substantially more. Taking those three items together—repairs to work and appropriations to the two funds mentioned—the total charge in respect of them was some £4600 more than in the previous year. That fact, in conjunction with the increased charges for rates, accounted for the fact that the profit on water in 1929 was less than in 1928.

Reverting to the gas accounts, he said that the price of gas over the whole year was 0·2d. per therm less than in 1928. At the beginning of 1928 the price was 9·2d. per therm; at the beginning of 1929 it was 9d., and after March it had fallen to 8·8d. The effect of that was to give to the consumers a reduction in price amounting to £9080. If that were added to the increased receipts, which increase amounted to some £19,684, it would be seen that there would have been a total increase of £28,764 if the price of gas had remained the same. That was due, of course, to the very much increased output.

Referring to the profit and loss account, he said the profit was less by £6290, and income-tax payment had increased to the extent of £8290. On the other hand, the Company was relieved in 1929 from Parliamentary expenses, which in 1928 had amounted to £9300. The balance-sheet position he believed would be regarded as satisfactory. The reserve fund was larger than it was a year previously by £10,374—made up of contributions and appropriations from the revenue account of £5000, and interest. The special purposes fund was increased by £17,729, and the renewal fund by £10,333, so that there was a total addition to the funds of £38,436. The Directors had continued their policy of having these funds substantially invested. Of the reserve fund, some £68,600—or more than half the fund—was invested. The co-partnership fund, which had increased during the year by nearly £30,000, had investments amounting to £142,000, as against £107,000 a year previously. The uninvested portion had decreased by about £5000. The Company was still maintaining the provision for retort renewals, built up on the old system, but had not had to draw upon it up to the present.

He felt justified in saying, he continued, that the balance-sheet was very satisfactory, and that the Company showed financial strength all round. He was inclined to the view, however, that the time had come, in so far as gas and water companies were concerned, when the authorities might consider the question as to whether the debentures, and possibly also the preference stock, might be made into trustee stock. By the facility to obtain cheaper capital, both the shareholders and the consumers would benefit. The Board might have an opportunity later of making representations to this effect on behalf of this Company and other undertakings.

COAL.

With regard to coal—a matter which was naturally agitating the minds of all responsible for the administration of gas undertakings—the Company was affected doubly, because it had to use fuel in connection with the water undertaking also. The Company had contracts running for some little while ahead yet which were not unsatisfactory, and it seemed inconceivable that there could be any interference with contracts made between a willing buyer and a willing seller, and where the Company had always paid, after negotiations, the price that had been asked. They were reducing the price of gas again from March next to 8·6d. per therm, and he hoped that, at all events in the immediate future, an increase in the price of coal would not render necessary the raising of the price of gas again.

So far as contemplated legislation was concerned, the Directors objected strongly to any differentiation as between public utility undertakings and those who consumed coal for other purposes. Why a public utility undertaking should be singled out specially it was difficult for them to understand; if it were necessary to help one industry, it seemed unfair to single out another industry or class of industry. If the price of coal increased, the Company would have to do what it was suggested it could do so easily—*i.e.*, pass on the additional cost to the gas consumer by increasing the price of gas, or withhold further reductions. The unfairness seemed to lie in the fact that gas business was a competitive business with electricity and oil; and coal was the prime necessity to the gas industry.

Referring to the operation of the Rating and Valuation Act, 1925, he said the new assessment came into force in April, 1929. The procedure was somewhat complicated, particularly in the case of this Company, inasmuch as it had property not only in one rating area but in several. Again, it supplied both gas and water, and the areas of supply of these two commodities were not co-terminous. The Board were advised that, following the usual practice, a valuation of the whole undertakings had to be made in order to arrive at the total assessment. This valuation had to be made by several bodies, and apparently the experts were at variance. Further, the Board felt aggrieved that, though they had given the valuers all the information asked for in April, 1928, had filled in the forms they were asked to fill in in July, 1928, and the notice of alteration of draft valuation was received as far back as March, 1929, yet, in February, 1930, they were still being asked for information, and had not been able yet to get a hearing by the Assessment Committee. And this did strike them as being unfair, inasmuch as they had to pay rates under the new Act as demanded on the disputed assessment which had been lodged, and not as under the former practice on the old assessment, when a sum was paid on account and the matter was settled up when complete. The Company had had to find the money, with a possibility

of recovering some of it if successful in reducing the valuation. The delay was vexatious, and, he ventured to think, very unfair.

There was a further difficulty, arising out of the fact that the water rental was dependent upon the assessment of the properties supplied. The Board had informed the Corporation at Bournemouth that for the moment they would continue to charge on the old assessments, until they knew what was the real position of the Company with regard to the rates it had to pay. Naturally, there were certain people in Bournemouth who said that the rate of charge on the assessments ought to be reduced, now that the valuation of property as a whole had gone up. The Board had met that by saying that they would continue to charge on the old assessments. But there were new properties being erected, and, these, of course, would have to pay a water rate based on their present valuations, made under the 1925 Act. It was suggested—not without some substance—that that was unfair as between one set of consumers and another. The Board did suggest—and representations were being made on behalf of this and other companies—that it ought to be possible, under the machinery of the 1925 Act, to have one valuation made, and to have it dealt with more promptly.

In a reference to dividends, he said that in respect of the year 1928 as a whole the Company had paid 8¾ p.ct. on the sliding-scale capital. In respect of both half-years of 1929 the Directors recommended 9 p.ct., so that the shareholders were getting some small increase in the return on their investment, which increase was amply justified by the results which the Directors had the pleasure of placing before them.

The CHAIRMAN then moved:

That the Directors' Report and Accounts for the year ended Dec. 31, 1929, as presented at this meeting, be received and adopted.

Sir CHARLES L. MORGAN (Deputy-Chairman) seconded.

There was no response to the Chairman's invitation to the shareholders to discuss the report and accounts—a fact which he regarded as indicating that they were not entirely dissatisfied—and the resolution was put to the meeting and carried unanimously.

DIVIDENDS.

The CHAIRMAN then moved that dividends for the second half of 1929 be paid at the rates of 6 p.ct. on the preference shares, 7 p.ct. on the "B" shares, and 9 p.ct. on the original (sliding-scale) shares, all *less* income-tax.

The resolution was seconded by Sir CHARLES MORGAN, and carried unanimously.

RE-ELECTION OF RETIRING DIRECTORS.

On the motion of the CHAIRMAN, seconded by Lieut.-Col. HAROLD W. WOODALL, Sir Charles L. Morgan was unanimously re-elected a Director of the Company.

On the motion of the CHAIRMAN, seconded by Sir GEORGE JESSEL, Bart., Sir John J. Withers was unanimously re-elected a Director.

RE-ELECTION OF RETIRING AUDITOR.

On the motion of Miss M. J. SMITH, seconded by Mr. MAXWELL, Mr. W. B. Paton, A.C.A., one of the Company's Auditors, who had retired by rotation, was unanimously re-elected.

VOTE OF THANKS TO THE STAFF.

The CHAIRMAN, proposing a very hearty vote of thanks to the Company's staff, said that in the paper written by Mr. Moon (which had been circulated to shareholders) a tribute had already been paid to the Outdoor Superintendent, Mr. H. Keen, and to those who had assisted him. He congratulated Mr. Moon on the fact that he had recently become a member of the Institution of Civil Engineers—a distinction which was deserved, and which it was hoped he would enjoy for many years. There were two things mentioned in the paper which gave an indication of the amount of work which had been done, and which, he believed, had surprised some people connected with other undertakings. The first was with regard to the sale of apparatus through the Company's showrooms. The Company had pursued a policy of establishing showrooms in various parts of the area, and in the period from 1912 to 1928 the sales of apparatus, excluding the charges for fixing, had reached a value of £510,700. In 1929 the sales reached a value of £61,084. Secondly, of all the new houses brought into occupation during 1929, there was not a single one wired for electricity only and from which gas was absent; that showed that the two commodities were being used side by side. Apart from that, Mr. Moon was continually erecting new plant. A new vertical retort house was being erected; there were extensions to water works; new plant for purification and filtration; new chemical work connected with the water undertaking, and so forth; and he was satisfied and pleased with the work done by his assistants. In London, Mr. Plumb (the Secretary) was a tower of strength to the Company. The Chairman also bore testimony to the value of the co-partnership scheme, which tended to real honest work and enthusiasm on the part of all in the employment of the Company, and also in financial benefit to them. So long as that continued, the Company need not be afraid of the future.

The vote of thanks was seconded by Mr. N. PHILLIPS, and carried unanimously.

Mr. MOON responded for the 1200 in the service of the Company at Bournemouth, who, he honestly believed, were enthusiasts on behalf of gas. Every member of the staff believed there was nothing like gas; they carried that spirit through all their work, and infected the whole of the people who served them with the same spirit, with the result that all in the service of the Company were proud of it, and of the industry. The paper which he had written, and which had been circulated to shareholders, was really a record of the most excellent work done by the Company's servants at Bournemouth—work that had been prompted by an enthusiastic belief in the commodity they were selling—and he was sure that the co-partnership spirit had been largely responsible for their enthusiasm.

Mr. ROBERT H. GLEN, F.C.A. (an Auditor of the Company), proposed a very hearty vote of thanks to the Chairman and his co-Directors for their service in the past year and in previous years. At a matter of interest he had compared the balance-sheet of the Bournemouth Company with those of other gas companies, and very few of those he had seen could rival the stability of that of the Bournemouth Company; he mentioned particularly the state of the funds. One item in the accounts which he had felt needed further investigation was that of the sale of fittings, because it seemed to him astonishing; but it was quite right. [Laughter.] In a reference to the paper written by Mr. Moon, he said he had obtained copies of it and had sent them to members of the European staffs of two gas companies in which he was interested in the Far East. Since that time there had been a surprising advance in the sales of fittings by those companies, and he attributed that result very largely to the fact that the staff had had the opportunity of perusing Mr. Moon's paper.

The vote of thanks was seconded by Miss M. J. SMITH, and carried unanimously.

The CHAIRMAN, in the course of his response, mentioned an instance in which the proprietor of a hotel in South Africa, when visiting London, had been induced to have his entire hotel fitted up with gas appliances as the result of what he had read in Mr. Moon's paper and elsewhere. The paper was of value to the gas industry as a whole, as, indeed, had been said in many quarters. Finally, the Chairman paid a tribute to the valuable co-operation of all the members of the Board.

The meeting then closed.

Gas Companies' Results for 1929.

Steady Progress Maintained.

BARNET.

The sales of gas by the Barnet District Gas and Water Company during the year ended Dec. 31, 1929, show an increase in quantity of 7½ p.ct. over the year 1928, and the water revenue shows an increase of 5½ p.ct. After placing to renewals (gas and water) funds the authorized contributions, writing off a proportion of Parliamentary costs, the payment of debenture and other interest, an interim dividend at the authorized rate of 7 p.ct. per annum, and the placing of £2000 to general reserve, there remains a balance of available profit of £46,561. The Directors now recommend the declaration of a dividend, *less* income-tax, for the half-year ended Dec. 31 last at the rate of 7 p.ct. per annum on the ordinary stock, leaving to be carried forward a sum of £28,268.

BURY ST. EDMUNDS.

The Ordinary General Meeting of Bury St. Edmunds Gas Company took place on Feb. 14—Mr. J. Ridley Hooper (Chairman of the Directors) presiding. Submitting the accounts and Directors' report, the Chairman said that there was considerable outlay during the year in re-laying mains in various parts of the town, so as to ensure a more adequate pressure and to supply the increased demand for gas. The new carbonizing plant continued to give satisfactory results. Their output of gas was nearly 84 million c.ft.—practically an increase of 3 p.ct. on 1928. In 1902 the output was 43 millions, so that Bury St. Edmunds had kept pace with the development of the gas industry throughout the country. Coke had realized about the same amount, and they were now able to supply their customers with a clean and evenly graded fuel in the form of broken coke. Tar had been a very poor market, the income from this residual having declined from £1869 to £1236. The demand for new apparatus in the shape of cookers, &c., had been good, and the increase in consumers satisfactory. New apparatus sold and fixed during 1929 was as follows: Cookers 175, fires and heating stoves 116, geysers, water heaters, &c., 47, boiling rings 64, sundry apparatus 14, total 416, and the increase in consumers during the year was 110 (17 ordinary, 93 slot). The Directors recommended the payment of usual dividends of 10s., 7s. 6d., and 7s. respectively, *less* tax, on the old 1849, 1859, and 1879 share capital of the Company, this being the final dividend on share capital. The next dividend would be declared on the consolidated stock, the new certificates in respect of which were issued last month.

DERBY.

The Directors of the Derby Gas Light and Coke Company present the accompanying statement of accounts for the year ended Dec. 31, 1929. An interim dividend of 3½ p.ct. was paid on the ordinary stock for the June half-year, and the Board now recommend the payment for the December half-year of a final dividend of

5 p.ct., making 8½ p.ct. (*less* income-tax) for the year. The Company's business continues to prosper. There are 1586 additional consumers, and the output of gas is higher by 103 million c.ft., representing an increase of approximately 5½ p.ct. over the previous year. The number of gas cooking stoves and fires sold or on hire is greater by 3935, and there is an addition of 1957 in other gas appliances sold for domestic and industrial purposes, making a total increase of 5892. In order to meet this continued additional demand for gas, and to provide for future requirements, the Directors have under consideration further extensions at the Litchurch and Belper Works, and also replacement and extension of the distribution plant.

DORCHESTER.

The sale of gas by the Dorchester Gas and Coke Company, Ltd., shows a slight decrease of 834,000 c.ft., which is undoubtedly due to the exceptional mild season during the latter part of the year under review. The Directors recommend a final dividend of 6 p.ct. on the preference capital, *less* income-tax, and 10 p.ct. on the ordinary capital, free of income-tax.

EAST SURREY.

The Directors of the East Surrey Gas Company submit the following accounts for the year ended Dec. 31 last. These figures include the first complete year's supply in the Dorking area. The combined sale of gas shows an increase of 5·2 p.ct. over 1928. The number of consumers at Dec. 31 last was 14,343. During the year £18,205 of 5 p.ct. irredeemable debenture stock was issued. Dividends at the under-mentioned rates per annum respectively—6 p.ct. on the cumulative preference stock, 5½ p.ct. on the preference "A" stock, and 5½ p.ct. on the ordinary "B" stock, all *less* income-tax—were paid for the half-year to June 30. The Directors recommend the payment of dividends in respect of the second half-year at the following rates per annum: 6 p.ct. on the cumulative preference stock, and 5½ p.ct. on the preference "A" and ordinary "B" stocks respectively—*less* income-tax—leaving a balance of £3924 to be carried forward.

FLEETWOOD.

At the half-yearly meeting of the Fleetwood Gas Company a profit of £2377 was announced. The Directors recommended that this sum, with £50 brought forward, should be allocated to dividends, and the balance of £199 carried forward. A washer scrubber had been installed in place of the old tower scrubber, with a view to increasing the efficiency of the purification plant. A manual retort charging machine had also been installed to increase the efficiency of the carbonizing plant. The whole of the works steam boilers and furnaces were now using smokeless fuel. The Directors had appointed Mr. William Trevor Jones as Manager. He came to Fleetwood from Widnes, where for over 20 years he was on the Gas Engineer's staff, latterly as Chief Chemist and Assistant. The Directors had also appointed Mr. P. Maycock, F.C.I.S., as Secretary and Accountant.

GLOUCESTER.

The Directors of the Gloucester Gas Light Company present the following statement of accounts for the year ended Dec. 31, 1929. There has been a satisfactory working throughout the year, and the increase in the sale of gas was 43,468·10 therms (equal to 9,434,000 c.ft.). When the accounts for the half-year ended June 30 last were considered by the Directors they decided to reduce the price of gas by 0·645d. per therm (equal to 3d. per 1000 c.ft.), to take effect after the reading of the meters for the past September quarter, making the present price 8·387d. per therm (or 3s. 3d. per 1000 c.ft.). An interim dividend at the rate of 5 p.ct. per annum (*less* income-tax) was paid in August last for the half-year ended June 30, 1929, and the Directors recommend the payment of the maximum statutory dividend at the same rate (*less* income-tax) for the half-year ended Dec. 31, 1929. The balance of £7500 of consolidated ordinary stock of the Company was sold by auction on Oct. 11 last at an average price of 88·83 p.ct. This covers the amount of £30,000 which the Directors were authorized by the proprietors to raise in February, 1927.

HARROGATE.

The Annual General Meeting of the proprietors of the Harrogate Gas Company was held at the Gas Office, Cambridge Street, Harrogate, on Feb. 18; the Chairman (Mr. Francis Barber) presiding. In presenting the report, the Chairman said: As soon as we obtain possession of our new premises in James Street we shall be well equipped and able to undertake the consolidation and organization of our business over the whole area now supplied with gas, covering, as appears in the report, one urban district and 44 parishes, as well as the Borough of Harrogate. Though no definite figures are available, I am able to say that on the receipts actually realized from our extended area in 1929 a net profit of £8488 was earned. This profit is equivalent to 7·06 p.ct. on £120,268, the total cost of the extension scheme. As to the £39,851 expended during the year appearing in capital account, the item for machinery and plant covers part cost of the new Drakes vertical retorts, new gasholder at Pateley Bridge, and new liquor tank on the light railway. The rest of the items cover 16 miles of mains and the necessary meters, cookers, and grillers on hire to 961 new consumers connected up during the year. Additional apparatus fixed on hire included 482 cookers and 236 grillers. The total consumption of gas for the year, 616,043,300 c.ft., shows an increase of 8,161,700 c.ft., equal to 1·34 p.ct. The cost of carbonizing 39,418 tons in 1928 was £9308, against that of £7918 for 41,287 tons in 1929. The total number of our consumers is now 19,535. It includes 450 new ones in the old area. The number of consumers in the 1927 area is now 5622. The ultimate result of the year's working is a profit of £33,987, being an increase of £4204 over the previous year.

HARTLEPOOL.

The profit for the year by the Hartlepool Gas and Water Company, including £15,148, the amount brought forward from last year, amounts to £62,692. After paying interest on debentures and providing for discount on new debenture stock, including expenses of issue 1927-28, &c., and an interim dividend of 2½ p.ct., *less* tax, there remains an available balance of £33,023, out of which the Directors now propose to declare a final dividend of 2½ p.ct., *less* income-tax (making 5 p.ct. for the year), absorbing £14,640, and leaving a balance of £18,383 to carry forward to the next account.

IPSWICH.

The Directors of the Ipswich Gas Light Company submit the following statement of accounts for the year ended Dec. 31, 1929. After payment of the interim dividend at the statutory rates and providing for interest and other charges, there is an available balance of £25,209. The Directors recommend the payment of the following dividends in respect of the December half-year—viz., at the rate of £6 7s. 6d. p.ct. per annum on the consolidated stock (making a dividend for the year of £6 6s. 10d.); at the rate of £5 p.ct. per annum on the redeemable stock; at the rate of £5 p.ct. per annum on the 5 p.ct. preference stock; and at the rate of £7 p.ct. per annum on the 7 p.ct. redeemable preference stock; which will absorb the sum of £8136, leaving a balance to carry forward of £17,072. The price of gas was reduced on April 1, 1929, to 9d. per therm, or 3s. 4½d. per 1000 c.ft. There was an increase in the quantity of gas sold for the year of 2·61 p.ct. The trunk main to Woodbridge has been completed, and gas is now being supplied to Woodbridge and Martlesham direct from the Ipswich Works. A showroom and office was opened in December last at 57, Thoro'fare, Woodbridge, which is proving of great convenience to the consumers. In accordance with the resolutions passed at the extraordinary meeting of stockholders in March last, an application was made to the Board of Trade for a Special Order under the Gas Regulation Act, 1920, authorizing the purchase of the undertaking of the Felixstowe Gas Light Company. This was duly obtained and took effect from Dec. 1, 1929.

LEATHERHEAD.

To meet the expenditure in connection with the considerable expansion of the Leatherhead Gas and Lighting Company's business, the Directors, in July last, issued the balance of the ordinary and preference capital, £19,917 in 6 p.ct. irredeemable preference stock. Towards the end of the year it was decided to raise the remainder of the loan capital by the issue of debenture stock bearing interest at 5½ p.ct. and redeemable, at the option of the Company, between 1945 and 1955. £5400 of this stock was placed at par, and the Directors are prepared to allot the balance, amounting to £19,605, at the same rate. Application will shortly be made to the Board of Trade under the Gas Undertakings Act, 1929, for an Order to increase the Company's borrowing powers. The new showrooms, offices, workshops, and stores referred to in the last annual report are now in occupation. The new premises are already showing improved returns in the sale of gas appliances, while the much-needed workshops and stores are enabling substantial working economies to be effected. The sale of gas during the year shows an increase of 7 p.ct. The Company's mains have been extended 8516 yards, and 253 new services laid. After providing for interest and all other charges the accounts show a balance of £7826. The Directors recommend the payment of dividends at the rate of 3 p.ct. and 3½ p.ct. on the preference stocks, making the maximum rates of 6 p.ct. and 6½ p.ct. per annum respectively on those stocks and 4½ p.ct., making, with the interim dividend of 2½ p.ct. paid in September, 7 p.ct. per annum on the ordinary shares. These dividends (less tax) will absorb £4497, and leave £455 to be carried forward to the next account.

LIVERPOOL.

Outstanding features of last year's working of the Liverpool Gas Company, as reviewed by the Chairman (Mr. H. Wade Deacon) at the annual meeting at the Company's Offices, Duke Street, on Feb. 18, were a record output of gas and a reduction of price equivalent to a saving to consumers of £29,873 per annum. A point emphasized was that in consequence of the relief to consumers, the sale of gas yielded only £1400 more than in 1928, though there was an increase of 2·85 p.ct. in the quantity sold. There was again a striking increase in the demand for gas cookers and fires. During the year the price of gas was reduced from 7·6d. per therm to 7·4d., and on the output this means a saving to the consumers of £29,873 per annum. For some time past, said the Chairman, we have been experimenting with the object of making a smokeless fuel that will ignite more easily than ordinary coke and burn satisfactorily in an ordinary grate. We have sold considerable quantities already, which have given much satisfaction to the users. We have decided to make larger quantities, and have ordered the necessary plant for the purpose. In order to distinguish this smokeless fuel from coke, we have called it "Dryco"—a name that I hope will become well known in Liverpool. We have expended on capital account a gross amount of £106,247, of which £62,999 was spent on new cookers, fires, &c. We now have 24,398 fires and 97,157 cookers on simple hire, and we added 10,840 to the number during last year. There are 6209 of these appliances on hire purchase under agreements now in force, and many thousands more sold outright by us or by dealers in the ordinary way. Turning to the income side of the accounts, it will be seen that the sale of gas yielded £1,888,441, and this was only £1400 more than the yield in 1928. There was an increase of 2·85 p.ct. in the quantity sold, and it is, therefore, entirely owing to the reduction in the price that the yield is practically the same. In consequence of the increased number of cookers and fires in use, the income from rents shows an increase of £8435, and this figure will naturally increase as more cookers and

fires are put into operation. Coke sales have produced rather more than in 1928.

MATLOCK.

The Directors' report and statement of accounts of the Matlock and District Gas Company for the year ended Dec. 31, 1929, states that the revenue account shows a profit of £5184. To this has to be added the unappropriated balance from the previous year of £17,651, making together £22,835. Against this has to be charged the interim dividend (*less* tax) paid in August last, debenture interest, and bank interest for the year amounting in all to £1477, leaving for disposal a sum of £21,357. This sum the Directors recommend shall be applied in the following manner—viz., by paying a dividend for the half-year ended Dec. 31, 1929, at the rate of 11s. 4½d. per share on the paid-up capital of the Company (making 8$\frac{9}{16}$ p.ct. for the year, *less* tax); and by carrying forward to the current year the balance of £18,908.

NEWCASTLE.

The report of the Newcastle-upon-Tyne and Gateshead Gas Company for the past year states that the revenue was £1,075,831, and the expenditure £888,257, leaving a profit of £187,257, to which is to be added dividends from the Redheugh Bridge Company, £520, and the balance brought forward from the previous year of £50,481, making a total of £238,576. The final dividend on the ordinary stock is to be at £2 17s. 6d. p.ct., making £5 7s. 6d. p.ct. for the year, and there remains to be carried forward £56,352. Sales of gas show an increase of over 2½ p.ct. upon the previous year.

OXFORD.

The Directors of the Oxford Gaslight and Coke Company recommend payment of the full statutory dividend of 5 p.ct. per annum on the preference stock, and a dividend of 10 p.ct. per annum on the ordinary stock, both *less* income-tax, for the half-year ended Dec. 31, 1929. This, with the interim dividend at the rate of 5 p.ct. per annum on the preference stock, and 10 p.ct. per annum on the ordinary stock, paid for the half-year ended June 30, 1929, makes 5 p.ct. per annum, and 10 p.ct. per annum, for the whole of the year on the two classes of stock respectively. The Directors have again to report a substantial increase in the consumption of gas during the year, and the demand for prepayment meters, gas fires, cooking stoves, and water heaters continues good. The Directors also report that, acting upon the resolution passed at the extraordinary general meeting of the proprietors of the Company held on March 1, 1929, they applied for a Special Order of the Board of Trade under section 10 of the Gas Regulation Act, 1920, to confirm the acquisition of the undertaking of the Abingdon Gas Light and Coke Company, Ltd., and to change the name of the Company to that of "The Oxford and District Gas Company," and they are glad to say that satisfactory progress is being made with the Order.

PORTSMOUTH.

The Annual Meeting of the Portsmouth Gas Company was held at the Company Offices on Feb. 13—Mr. T. H. F. Lapthorn, J.P., presiding. In presenting the report and statement of accounts, the Chairman said he was glad to be able to report another satisfactory year. They had sold 11,844,814 therms of gas, or, stated in the more familiar way, 2,632,181,000 c.ft., an increase during the year of 123,497,000 c.ft., nearly 5 p.ct., or, to be exact, 4·92. Nearly the whole of that increase was in the first six months. He did not intend to detain them with the capital account. There was nothing there that called for comment. The expenditure had been normal, such as was inevitable with every growing concern, so he would turn at once to the revenue account. Their receipts from the sale of gas to private consumers were down by £9280 compared with the corresponding period of the previous year. That was explained by the fact that the price they were charging consumers was 0·56d. per therm (rather more than a halfpenny) lower in 1929 than it was in 1928, and that reduction in price would amount to a reduction in their receipts of £27,000, which was a great deal more than the drop in their total receipts. They would see in the repairs to the works that they were up by £6671, and that was due to the fact that they were compelled to make extensive repairs to the Rudmore gasholder, due entirely to old age. They had now put it in a condition which would make it efficient for many years to come. Their profit on the year's working was £70,043, and was down by £7719. He had already said enough to show them the cause of that—the reduced price of gas and the smaller receipts from residuals. But in spite of that slightly reduced profit they were recommending the same dividend, 8 p.ct., for the year, of which payment of 4 p.ct. was made in the earlier part of the year. They had no hesitation in making that recommendation, because they had sufficient confidence in the undertaking to know that they could afford to continue that dividend. After paying the dividend, they would be left with £38,100 with which to start this year, and that, again, was £7802 less than the carry-forward at the beginning of 1929. Dealing with the progress of the Company, the Chairman said they had out in the district 86,279 meters, an increase during the year of 2269. They had out on hire cookers, fires, and other appliances to the number of 79,399, an increase of 2685 during the year. In addition, they sold from stock 2366, and there were, of course, a number which were bought not from them but from the builders' merchants and ironmongers in the city, so that the figure he had given of those on hire did not by any means represent the total number of the appliances out in the district. Since they went to Havant, the sale of gas had increased there by 70 p.ct., and the increase at Emsworth had been 97 p.ct., or nearly double.

SHANKLIN.

The Directors of the Shanklin Gas Company submit the following accounts for the year ended Dec. 31, 1929. The balance standing to the credit of the profit and loss account is £11,907 after payment of an interim dividend of 3 p.ct., *less* income-tax. The Directors recommend the declaration of a final dividend of 5 p.ct. for the half-year, making 8 p.ct. for the year, *less* income-tax. There has been an increase in the sale of gas over the year 1928 of 5,204,900 c.ft., equal to 8¾ p.ct. Negotiations are in progress for a scheme for the amalgamation of the Shanklin and Ventnor Gas Companies, and in due course the stockholders' approval will be asked for.

SHEFFIELD.

The total quantity of gas sold by the Sheffield Gas Company during the past year was 5,124,135,000 c.ft., being an increase of 140,239,000 c.ft., or 2·81 p.ct. on the previous year. The price of gas throughout the year has remained at 6¾d. per therm, or 2s. 9d. per 1000 c.ft., for small quantities, with proportionate reductions to large consumers, the lowest price being 2¾d. per therm, or 1s. per 1000 c.ft. An interim dividend at the rate of 6½ p.ct. per annum was paid for the half-year ended June 30, 1929, and it is now proposed to pay a final dividend to Dec. 31, 1929, at the same rate, making a total distribution for the year of 6½ p.ct. After the payment of these dividends, there remains a balance of £74,884 to be carried forward to next year.

SOUTH SHIELDS.

The revenue of the South Shields Gas Company amounts to £131,072, and the expenditure to £109,414, leaving a profit of £21,657. Add bank interest and balance from previous year, and the total is £35,725; which it is proposed to apportion as follows: Year's dividend on consolidated and new stocks at 8½ p.ct. per annum, *less* income-tax; year's dividend on ordinary stock at 5¾ p.ct. per annum, *less* income-tax; and year's interest on mortgages, &c.; leaving a balance to carry forward of £14,051. During the year there has been an increase in the sale of gas of approximately 4¾ million c.ft., and the number of consumers has increased by 376. The revenue account shows a decrease in receipts of £9115, and a decrease in expenditure of £8731. As from the March reading of the meters to the end of the year the price of gas was reduced by 2¾d. per 1000 c.ft., or ½d. per therm.

SOUTH STAFFORDSHIRE MOND.

The amount of fuel gasified by the South Staffordshire Mond Gas Company during the year is 15½ p.ct. more than last year, while the cost of fuel gasified is 20 p.ct. more than for 1928. The gas distributed during the year is 14 p.ct. more than during 1928. The gross profit for the year is £21,962, from which has to be deducted prior lien and debenture stock interest amounting to £12,916, leaving a net profit for the year of £9045. £15,093 has been brought forward from the previous year, which makes the amount of undivided profit standing to the credit of the profit and loss account at Dec. 31, 1929, £24,139. The Directors recommend that a dividend of 6 p.ct. for the year 1929 be paid, *less* tax, to holders of cumulative preference shares. After paying preference dividend, the amount standing to the credit of profit and loss account is £19,189. The Directors recommend that a dividend of 1 p.ct. (*less* tax) be paid to all ordinary shareholders.

SOUTHAMPTON.

The Annual Ordinary General Meeting of the Southampton Gaslight and Coke Company was held on Wednesday, Feb. 12, 1930, at the Central Offices and Showrooms, 66, Above Bar, Southampton—Sir Russell Bencraft, M.R.C.S.E., J.P. (Chairman), presiding. The report and accounts having been taken as read, the Chairman, moving their adoption, said that, so far as the sales of gas were concerned, the past year had been a record one in the history of the Company, both as regards output and increase, upwards of 1485 million c.ft. having been sold during the year, while the increase in sales over the previous year was nearly 100 million c.ft. The Company had more than doubled its business in the past 20 years, the increase in sales during that period being 774 million c.ft., or 108 p.ct. That, he thought all would agree, was the best answer one could have to the suggestion that gas was a decadent industry. Capital expenditure for the year amounted to £33,810, *less* £8684 for depreciation on gasholders, meters, cookers, and fires, leaving a net expenditure of £25,126. With the exception of £4275 for land and property acquired, the capital had been expended on new mains, meters, cookers, fires, and installations to meet the demands of additional customers (numbering 3059), mostly in the outlying district in the Company's area of supply. In the revenue account, "manufacture of gas" showed an increase of £4100. That was to be expected by reason of increased sales of gas. Over 12,000 additional tons of coal were used in the manufacture of gas, but on the other hand, less oil and coke were required for the manufacture of carburetted water gas. Coal was lower in price than in 1928. Notwithstanding the reduction in the price of gas, the gross profit for the year was only £2800 less than in 1928, and after paying interest on the debenture stocks, bank interest, income-tax, and transferring £7000 to reserve fund, the balance left was sufficient to pay the maximum dividend on the ordinary stock, and to carry forward to the next account a sum of £1709. Mr. J. R. H. Jacobs, in seconding, said an interesting feature was how gas was used for cooking in this town. On Christmas Day of 1928 they had a record output of gas of 5 million c.ft. For the Christmas Day of 1929 they had nearly 1 million increase on the corresponding Christmas Day. On Christmas Day of 1929 their output was over 6 million c.ft., and in one hour, from 12 to 1 o'clock, they sent out over three-quarters-of-a-million c.ft. of gas. Another interesting point was in connection with the increased sales of apparatus. It might be thought that in a town like Southampton consumers had all they required as regards gas cookers, fires, &c., but last year the Company sold, in addition to those let on hire, 896 gas cookers, 936 geysers, 1370 gas coppers, and 960 fires and radiators, showing that business in those sales was still going on, and the public were realizing the benefits to

be derived from gas. Another interesting fact was with regard to the monies collected from meters. It might astonish the shareholders to know that in the course of the year the Company collected from meters no less than £178,000. Converting that into pennies, what did they find?—that there had been placed in the meters nearly 43 million pennies during the year.

STAINDROP.

At the Annual Meeting of Staindrop Gas Company, Durham, a profit on the year's working was reported, but it was decided not to declare any dividend. Mr. J. S. Watson, who has been Secretary of the Company since its formation, has resigned, and Mr. J. Bradley has been appointed to succeed him.

TOTTENHAM.

The Tottenham and District Gas Act, 1928, provided, *inter alia*, for the acquisition of the Waltham and Cheshunt Gas Company as at Jan. 1, 1929, since which date the Tottenham Company has supplied gas within the extended area. The gas sales show an increase of 4·18 p.ct. for the year. After payment of dividends in respect of the half-year ended June 30, 1929, at the full statutory rates, all *less* income-tax, providing for interest, the special charges set out in the profit and loss account, and transferring the sum of £7659 to special purposes fund, the accounts for the year show a surplus of £1856, which has been added to the carry-forward. The Directors declared the payment of dividends in respect of the half-year ended Dec. 31, 1929, at the rates of 5½ p.ct. per annum and 5 p.ct. per annum respectively on the preference stocks, and £6 12s. 6d. p.ct. per annum on the ordinary stock.

TUNBRIDGE WELLS.

The Directors of the Tunbridge Wells Gas Company present the following report and statement of accounts for the year ended Dec. 31, 1929. The Special Order to provide for the transfer of the Crowborough District Gas Company, and for additional general powers, was sanctioned by the Board of Trade on May 9, 1929, and the accounts herewith show the results of the combined Companies as and from the appointed day—namely, Jan. 1, 1929. The "ordinary," "B," "C," and "D" stocks have been converted, and new certificates for sliding-scale and maximum dividend stocks have been exchanged with the proprietors. For the convenience of consumers, new premises have been purchased at Crowborough Cross, and as soon as the necessary alterations have been completed these premises will be opened as branch offices and showrooms, and it is hoped that the Company's business will further develop in this district. A new main has been laid through Eridge to the Crowborough works for the purpose of supplying gas direct from Tunbridge Wells. The Crowborough works will shortly be used as a distributing station only, and it is anticipated that considerable economies will in this way be effected. In order to provide for the continued growth of the Company's business, additional capital was raised in the month of November by the issue of £25,000 sliding-scale stock and £21,500 5½ p.ct. perpetual debenture stock, realizing satisfactory prices. There has been continued progress and extension of the Company's business, and the sale of gas during the year shows an increase of over 7 p.ct. As from Dec. 30, 1929, the calorific value of the Company's gas has been declared at 475 B.Th.U., in substitution of 450 B.Th.U. The accounts show that, after deducting the interim dividend at the rate of £7 4s. p.ct. per annum on the sliding-scale stock and £5 p.ct. per annum on the maximum dividend stock, providing for all fixed charges, and carrying £2500 to the renewal fund and £2500 to the reserve fund, there remains for division a balance of £33,068, and the Directors recommend the declaration of the dividend at the same rates (*less* income-tax) for the half-year to Dec. 31, 1929, leaving a balance of £26,566 to be carried forward to the next account.

WATFORD AND ST. ALBANS.

The Directors submit the following statement of accounts of the Watford Gas and Coke Company and of the St. Albans Gas Company for the year ended Dec. 31, 1929. The sale of gas in the combined areas of supply shows an increase of over 44 million c.ft. The works and plant are in good order, and considerable extensions of mains have taken place during the course of the year. By an Order dated Dec. 11, 1929, the Watford Gas and Coke Company and the St. Albans Gas Company were amalgamated as from Jan. 1, 1930, and the name of the Company changed to "The Watford and St. Albans Gas Company." The Directors recommend the payment of final dividends of 4 p.ct. on the "A" stock and 3½ p.ct. on the "B" stock, *less* income-tax, these amounts making, with the interim dividend paid in August last, 8 p.ct. on the "A" stock, and 6½ p.ct. on the "B" stock, *less* income-tax, for the year. In accordance with the provisions of the Watford and St. Albans Gas Order, 1929, the Directors have decided to pay a final dividend of 4 p.ct., *less* income-tax, on the St. Albans Gas Company's consolidated stock.

WELLINGBOROUGH.

The profits of the Wellingborough Gas Light Company, after providing for income-tax and interest, amount to £4247. Expenses in connection with the formation of the Company and the issue of shares, to the amount of £795, have hitherto formed part of total expenditure on capital account. The Companies Act, 1929, provides that such expenses must be shown separately, and the Directors have therefore decided to write them off. The balance available for dividend is £10,090, and the Directors recommend that out of this sum dividends of 7½ p.ct. on the original and 6 p.ct. on the additional shares, *less* income-tax, be declared for the half-year. The payment of dividends and tax thereon will absorb the sum of £4206, leaving a balance of £5883 to be carried forward.

WESTON-SUPER-MARE.

A further record in the sales of gas by the Weston-super-Mare Gaslight Company has been made, the increase over 1928 representing 3·64 p.ct. The total quantity of gas sold exceeds 410 million c.ft. The Directors recommend the payment of the maximum dividend of 5 p.ct. on the ordinary stock, the maximum dividend of 6½ p.ct. on the 6½ p.ct. redeemable preference stock, and the maximum dividend of 6 p.ct. on the 6 p.ct. redeemable preference stock, for the half-year ended Dec. 31, 1929, *less* income-tax.

WHITBY.

The Directors of the Whitby Gas Company submit the following statement of accounts for the year ended Dec. 31, 1929. The profit and loss (or net revenue) account after charging the same with interest on debenture stock, interest on preference stock, and interest on deposits, and after providing for the interim dividend paid to June 30 last, shows a balance of £3505, out of which the Directors recommend the payment of dividends at the rate of 3 p.ct., *less* income-tax, on the original capital, and of £2 2s. p.ct., less income-tax, on the additional and new additional capital, for the half-year ended Dec. 31, 1929, making, with the interim dividends paid for the half-year ended June 30, 1929, 6 p.ct. on the original capital, and £4 4s. p.ct. on the additional and new additional capital for the year. This will absorb £918, leaving a balance of £2587 to carry forward. The sale of gas shows an increase over last year of 1¼ million c.ft. The price was reduced in April last. Under the Gas Undertakings Act, 1929, and the Whitby Gas (Charges) Order, 1929, the Board of Trade have made it obligatory for the Directors to charge for gas supplied by the Company by therm as from Jan. 1, 1930. During the year 179 new consumers have been connected up.

WINCHESTER.

The Directors of the Winchester Water and Gas Company submit the following accounts of the Company for the year ended Dec. 31, 1929. The balance of net revenue available for dividend is £12,718. Interim dividends of £2 and £2 15s. p.ct. on the preference stocks and £2 10s. p.ct. on the consolidated ordinary stock, *less* income-tax, were paid in September last, and the Directors now recommend the payment of balance dividends of £2 and £2 15s. p.ct. on the preference stocks and £3 p.ct. on the consolidated ordinary stock, less income-tax; the additional 10s. p.ct. on the consolidated ordinary stock representing the undivided portion of the authorized dividend for the half-year ended Dec. 31, 1904. The sale of gas during the year has increased by over 12 million c.ft., or nearly 6½ p.ct. over the year 1928. The Directors propose to reduce the price of gas by ½d. per therm, making the price 10¾d. per therm (equivalent to 4s. per 1000 c.ft.) as from Lady Day meter reading, the rates of discount to remain unaltered.

WORTHING.

There is an increase of 11 p.ct. in the total quantity of gas sold by the Worthing Gas Light and Coke Company as compared with the previous year. Further consolidated ordinary stock of the nominal value of £1287 has been issued to the co-partners during the year. The profit and loss account shows a balance of £38,487, after transferring £1000 to the reserve fund. The Directors have paid dividends (*less* income-tax) of 5½ p.ct. per annum on the preference stock and 7 p.ct. per annum on the consolidated ordinary stock for the half-year to June 30, 1929, and now recommend the declaration of dividends (*less* income-tax) at the rate of 5½ p.ct. per annum on the preference stock and 7 p.ct. per annum on the consolidated ordinary stock of the Company for the half-year to Dec. 31, 1929.

YORK.

The annual meeting of the stockholders of the York Gas Company was held at the offices of the Company, Davygate, York, on Feb. 13—Mr. A. PROCTOR, Chairman of the Directors, presiding. In moving the adoption of the report and balance-sheet, the CHAIRMAN said: It is very gratifying to be able again to report an increase in gas accounted for of 72,680 therms, equivalent to 15,142,000 c.ft. It is true that the revenue from sales of gas shows a decrease of £384, but this is explained by the fact that in 1928 the price of gas for the first quarter of the year, which, being a winter quarter, was one of the heaviest in consumption, was 8d. per therm, while the price for the remaining three quarters was reduced to 7½d. per therm, which price ruled throughout the year 1929. The receipts from residuals show a total net increase of £1567, coke being increased by £1880 and tar by £326, and ammonia being decreased by £650. On the side of expenditure we have spent £3023 less under the heading of manufacture and repairs of works, and £3538 more under the heading of distribution. On this heading the expense of renewal of mains is a large item, and in an undertaking so old as ours it is obviously an inevitable and recurring expenditure. The serious burden of taxes and rates has caused an increase of £585 over the previous year. The amount placed to the special purposes fund has been increased from £2500 to £2853 as I had before mentioned, and we have been able to make a further provision for contracts on hand of £8000. With a view of encouraging the use of gas, we have put into operation as from the beginning of this year a scale of discounts for domestic services. We trust that it will operate to the mutual advantage of the Company and the consumers, permitting, as it does, the economical use of gas for a wider range of purposes. We are constantly alive to the desirability of finding new outlets for gas both in the industrial and domestic fields, and for domestic consumers we have satisfied ourselves that the new storage hot water system, which we have subjected to severe tests, offers a practically new and potentially large demand at the price and scale of discount now ruling in York. Mr. J. J. Hunt, Vice-Chairman, seconded the resolution, which was unanimously adopted.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Feb. 21.	Rise or Fall on Week.	Transactions Lowest and Highest Prices During the Week.
			% p.a.	% p.a.				
171,978	Stk.	Feb. 6	5	5	Aldershot 5 p.c. max. C.	73—78	..	..
332,992	,,	,,	4	4	Do. 4 p.c. Pref.	70—73	..	71
1,851,968	,,	Sept. 26	7⅝	7⅝	Alliance & Dublin Ord.	93—96	..	93½—94½
774,000	,,	Jan. 9	4	4	Do. 4 p.c. Deb.	60—63	..	..
552,555	,,	Aug. 29	7	7	Barnet Ord. 7 p.c.	112—115	..	113½—115
980,000	1	Oct. 24	1/4½	1/4½	Bombay, Ltd.	16/—18/-	..	..
174,500	10	Aug. 29	8½	9	Bournemouth 5 p.c.	18—18½	..	..
600,050	10	,,	7	7	Do. B 7 p.c.	12⅜—12⅝	..	..
699,160	10	,,	6	6	Do. Pref. 6 p.c.	10½—11¼	..	..
80,000	Stk.	Dec. 19	3	3	Do. 3 p.c. Deb.	53—56	..	..
103,025	,,	,,	4	4	Do. 4 p.c. Deb.	72—75	..	..
307,900	,,	Aug. 29	7½	7½	Brighton & Hove 6 p.c. Con.	113—116	..	..
271,880	,,	,,	6½	6½	Do. 5 p.c. Con.	100—103	..	..
1,927,500	,,	Feb. 20	5	5	Bristol 5 p.c. max.	86—87a*	—1	..
955,000	,,	Sept. 12	7½	7	British Ord.	112—117	..	113½—114
100,000	,,	Dec. 19	7	7	Do. 7 p.c. Pref.	109—114	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	69—71	..	..
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	92—95	..	..
100,000	,,	Jan. 9	5	5	Cambridge 5 p.c. Deb.	88—91	..	..
100,000	10	Dec. 5	8	6	Cape Town, Ltd.	8½—9½	..	9⅛
100,000	10	Nov. 7	4½	4½	Do. 4½ p.c. Pref.	6½—7½	..	..
150,000	Stk.	Dec. 19	4½	4½	Do. 4½ p.c. Deb.	69—74	..	..
696,860	,,	Feb. 20	6	6	Cardiff Con. Ord.	96—99*	—2	..
227,860	,,	Jan. 9	7½	7½	Do. 7½ p.c. Red. Deb.	98—101	..	..
107,150	,,	Feb. 20	5	6½	Chester 5 p.c. Ord.	87½—92½b*	—2½	..
98,986	1	Oct. 10	‡2/-	‡2/-	Colombo, Ltd. Ord.	34/—36/-	..	..
24,496	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	19/—21/-	..	..
975,402	1	Oct. 10	1/9⅜	1/9⅜	Colonial Gas Assn. Ld. Ord.	20/6—22/6	..	..
197,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/-	..	..
1,973,280	Stk.	Feb. 20	6	7	Commercial Ord.	87—92*	—3	87—91
475,000	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	54—57	..	..
797,580	,,	Feb. 20	7	7	Croydon sliding scale.	102—105*	—2	103—106½
498,100	,,	,,	5	5	Do. max. div.	78—88*	—2	84—85
542,270	,,	Aug. 29	10	7	Derby Con.	120—125e	..	..
55,000	,,	Dec. 19	4	4	Do. Deb.	67—70e	..	..
200,000	,,	Aug. 29	5	5	East Hull Ord. 5 p.c.	73—75	..	..
1,002,180	10	Sept. 12	†7	†4	European, Ltd.	12½—14½	—½	12⅞—13½
18,629,125	Stk.	Feb. 20	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	17/6—18/-f*	—1/-	17/6—18/1½
2,000,000	,,	,,	3½	3½	Do. 3½ p.c. max.	60—62*	—1	62½
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	75—78*	—1	77⅛—77⅞
5,932,620	,,	Dec. 19	3	3	Do. 3 p.c. Con. Deb.	57—59	..	57⅛—58½
1,643,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	97—100	..	99½
82,500	,,	Aug. 29	7	7	Hastings & St. L. 5 p.c. Conv.	98—103	..	..
268,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	78—83	..	..
70,000	10	Oct. 10	‡10	‡10	Hongkong & China, Ltd.	13⅝—14⅝	+⅛	14¼—14⅜
213,200	Stk.	Aug. 29	6	6	Hornsey Con. 3½ p.c.	90—98	..	..
1,976,000	,,	Nov. 1	20	10	Imperial Continental Cap.	360—380	..	363—375
233,180	,,	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb.	70—75	..	73—75
235,242	,,	Aug. 15	7½	8	Lea Bridge 5 p.c. Ord.	115—118	..	..
1,145,907	,,	Feb. 20	6	6	Liverpool 5 p.c. Ord.	88½—99½b*	—1½	..
600,000	,,	Sept. 26	7	7	Do. 7 p.c. Red. Pref.	100½—102½b	..	..
165,736	,,	Feb. 20	9	8	Maidstone 5 p.c. Cap.	119—124*	—3	..
68,480	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	52—55	..	..
75,000	,, 5	Dec. 5	†10	†10	Malta & Mediterranean	5½—6	..	..
288,000	—	Oct. 1	5½	5½	Metrop'itan (of Melbourne) 5½ p.c. Red. Deb.	92—95	..	..
541,920	Stk.	Nov. 21	†9	†6	Montevideo, Ltd.	107—112	..	109
1,061,315	,,	Feb. 20	5⅔	5⅔	Newcastle & Gateshead Con.	15/9—16/6dy*	—/10½	..
692,856	,,	,,	4	4	Do. 4 p.c. Pref.	70½—71½d*	—1½	..
691,705	,,	Dec. 19	3½	3½	Do. 3½ p.c. Deb.	66½—67½d	..	..
131,780	,,	Aug. 29	7/1/0	7½	North Middlesex 6 p.c. Con.	112—117	..	..
166,160	,,	Feb. 6	5	5	Northampton 5 p.c. max.	74—77	..	..
100,000	,,	Nov. 21	7	9	Oriental, Ltd.	108—113	..	..
60,000	,, 5	13 My., '15	—	—	Ottoman	0—½	..	..
205,162	Stk.	Jan. 9	8	8	Plym'th & Stonehouse 5 p.c.	107—110	..	..
494,416	,,	Feb. 20	8	8	Portsm'th Con. Stk. 4 p.c. Std	110—115*	—3	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	78—81*	—2	..
1,384,464	,, 1	June 27	—	‡5	Primitiva Ord.	27/—29/-	—1/-	..
164,500	100	Dec. 2	4	4	Do. 4 p.c. Red. Deb.	92—95	..	..
695,000	Stk.	Jan. 23	4	4	Do. 4 p.c. Red. Deb. 1911	77—80*	..	..
416,345	,,	Dec. 19	4	4	Do. 4 p.c. Cons. Deb.	77—80	..	..
150,000	,, 10	Sept. 26	6	6	San Paulo 6 p.c. Pref.	8⅝—9½	..	..
1,786,988	Stk.	Aug. 29	6⅔	6½	Sheffield Cons.	105—107e	..	..
95,000	,,	Jan. 9	4	4	Do. 4 p.c. Deb.	76—78e	..	..
90,000	,, 10	June 13	‡4	‡4	South African	4—6	..	..
1,709,895	Stk.	Feb. 20	5	7½	South Met. Ord.	97—99*	—3	97½—101½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	106—108*	—1	106
1,466,445	,,	Jan. 9	3	3	Do. 3 p.c. Deb.	55—58	..	..
784,000	,,	Sept. 12	6½	6½	Do. 6½ p.c. Red. Db.	99—101	..	100¼—101
91,500	,,	Aug. 15	8½	8½	South Shields Con.	109—111d	..	..
1,548,795	,,	Feb. 20	6½	6½	South Suburban Ord. 5 p.c.	98—101*	—3	100
488,897	,,	Dec. 19	5	5	Do. 5 p.c. Deb.	92—95	..	..
647,740	,,	Feb. 20	5	5	Southampton Ord. 5 p.c. max.	75—78*	—2	..
131,275	,,	Dec. 19	4	4	Do. 4 p.c. Deb.	69—72	..	..
178,014	,,	Feb. 20	8	8	Sutton Ord.	113—116*	—3	..
97,888	,,	Jan. 9	5	5	Do. 5 p.c. Deb.	91—94	..	..
300,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
300,000	,,	Dec. 19	6½	6½	Do. 6½ p.c. Red. Deb.	99—101	..	..
1,076,490	,,	Aug. 15	6⅔	6⅔	Tottenham District Ord.	101—106	..	103—103½
158,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100	..	..
196,005	,,	Dec. 5	4	4	Do. 4 p.c. Deb.	70—73	—2	..
128,380	10	30 Dec., '12	—	—	Tuscan, Ltd.	4—5	+½	4
95,703	Stk.	Sept. 26	6	6	Do. 6 p.c. Red. Deb.	75—80	..	..
600,804	,,	Aug. 29	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	97—102	..	..
85,300	,,	,,	5	5	Do. 5 p.c. pref.	85—90	..	..
1,180,970	,,	—	—	—	Wandsworth, Wimbledon, and Epsom Cons.	105—110	..	..
300,000	,,	Feb. 20	5	5	Do. 5 p.c. Pref.	85—90*	—2	..
499,344	,,	Dec. 19	5	5	Do. 5 p.c. Deb.	91—95	..	92

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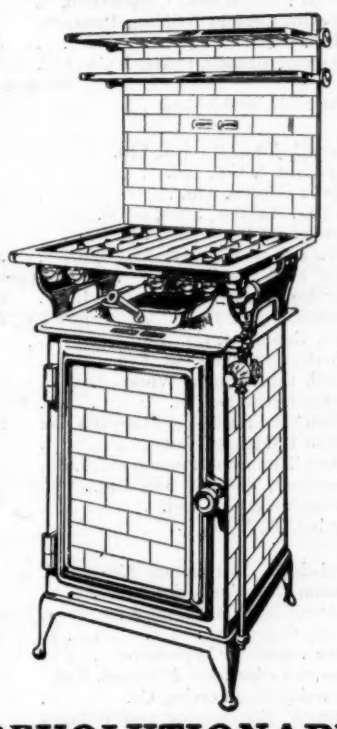

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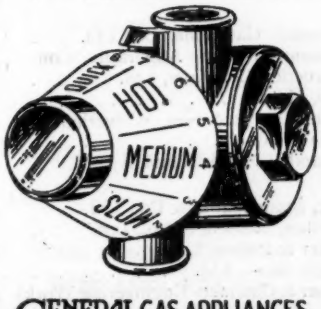

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Applications, endorsed "Senior Draughtsman," giving full particulars of Training, Experience, and Age, together with References, should be addressed to the Chairman of the Gas Committee, Town Hall, Manchester, not later than 10 a.m. on Friday, March 7, 1930.
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Town Clerk.
February, 1930.

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Tenders are to state the Volatile and Ash Content.
The Committee do not bind themselves to accept the lowest or any Tender, and reserve the right to divide any Offer as they may decide.
No Special Form of Tender is issued, and Tenders, endorsed "Tenders for Coal," are to be in my hands not later than March 15, 1930. Envelopes to be marked "Tenders for Coal."
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F.C.S., A.M.I.Chem.E.,
Gas and Water Engineer and Manager.
Gas and Water Works,
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Feb. 15, 1930.

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(*Stock Issues continued on p.* 602.)

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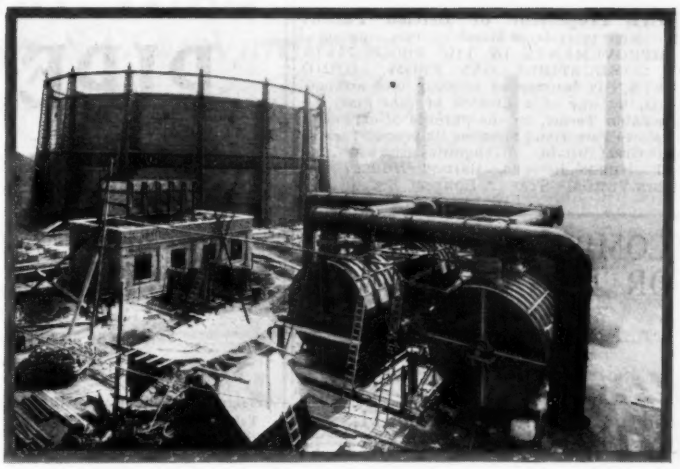

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THE Proprietor of British Patent No 235625 dated March 17, 1924, relating to "IMPROVEMENTS IN THE PRODUCTION OF COMBUSTIBLE GAS FROM LIQUID FUELS," is desirous of entering into arrangements, by way of a License or otherwise, on reasonable Terms, for the purpose of exploiting the above Patent and ensuring its practical working in Great Britain. All enquiries to be addressed to F. HERON ROGERS, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, LONDON, E.C. 4.

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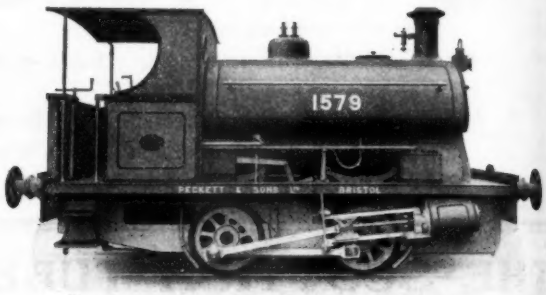

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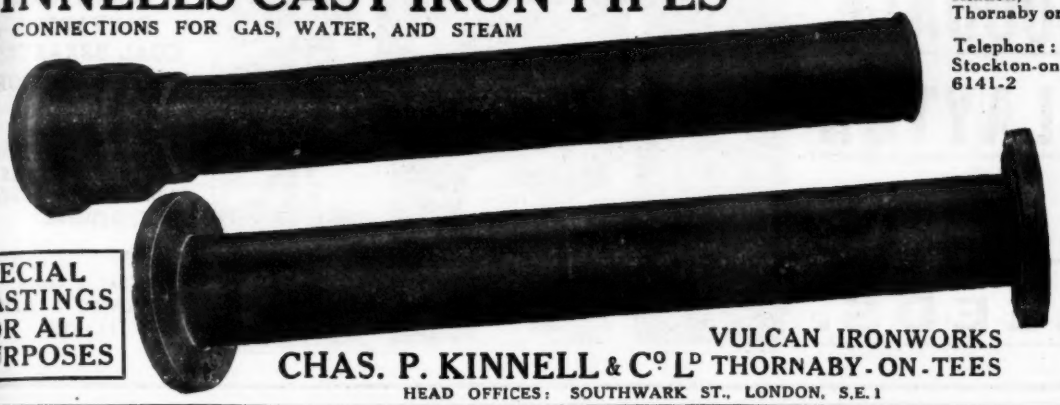

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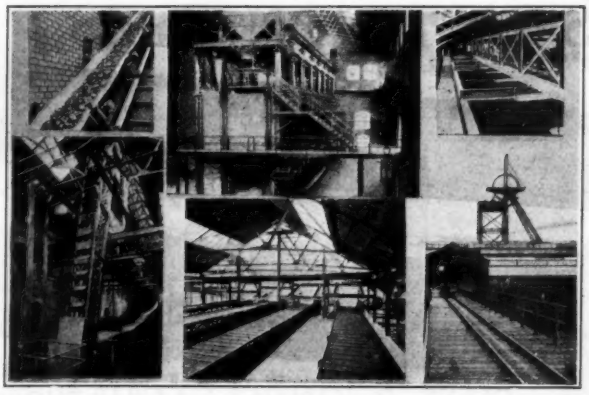

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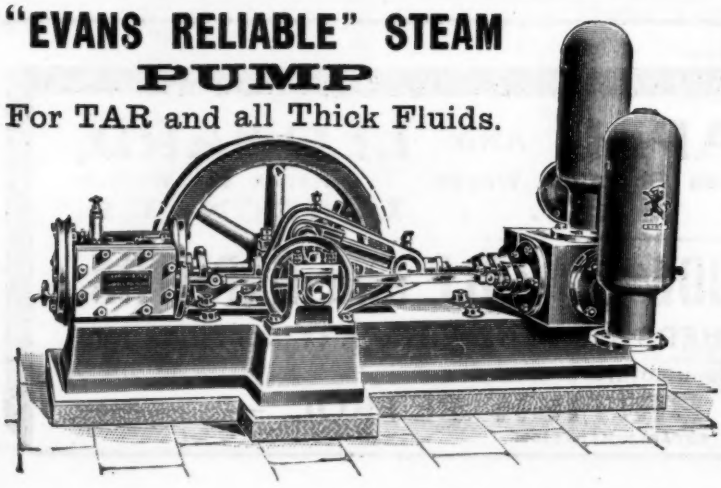

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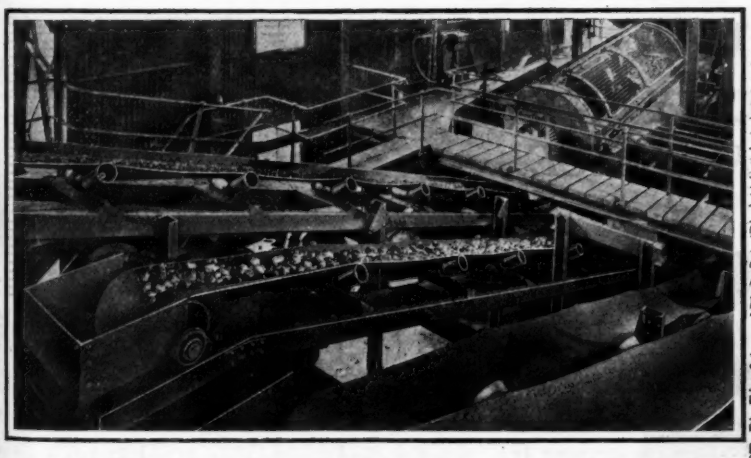

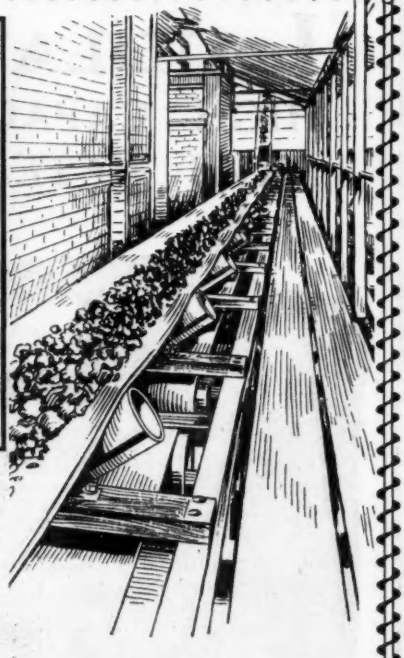

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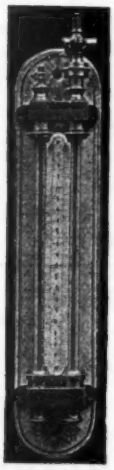
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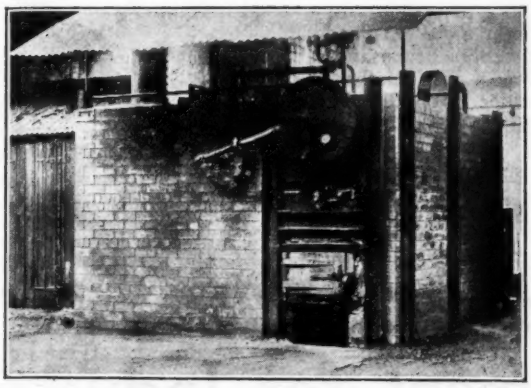

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